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DISSERTAÇÃO DE MESTRADO EM EPIDEMIOLOGIA

# A comparative analysis of psychiatric emergencies in two different emergency department models in Portugal

Apresentada sob a orientação de Sofia Gonçalves Correia
e co-orientação de Orlando von Doellinger

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| | |
|---|---|
| ARS | Administração Regional da Saúde |
| CHSJ | Centro Hospitalar de São João, E.P.E. |
| CHTS | Centro Hospitalar do Tâmega e Sousa, E.P.E. |
| CSP | Cuidados de Saúde Primários |
| DALY's | Disability Adjusted Life Years |
| ED | Emergency Department |
| ICD-9 | International Classification of Diseases, 9$^{th}$ revision |
| LWBS | Left without being seen |
| MTS | Manchester Triage System |
| NOS | Not otherwise specified |
| PE | Psychiatric emergency |
| SNS | Serviço Nacional de Saúde |
| UMPP | Urgência Metropolitana de Psiquiatria do Porto |
| USF | Unidade de Saúde Familiar |

# ABSTRACT PT

Nas últimas décadas tem-se verificado um aumento progressivo do recurso ao serviço de urgência por causas de natureza psiquiátrica. Esta procura por cuidados urgentes de saúde mental em contexto de urgência tem levado ao desenvolvimento de diversos modelos de urgência psiquiátrica. Em Portugal estão instalados diversos serviços de urgência psiquiátrica, porém, um grande volume de crises de saúde mental continua a ser orientado em serviços de urgência polivalente, sem cuidados especializados de Psiquiatria.

Este trabalho pretende comparar as urgências psiquiátricas em dois modelos distintos de serviço de urgência no Norte de Portugal: a Urgência Metropolitana de Psiquiatria do Porto - um serviço metropolitano de urgência psiquiátrica num hospital terciário (Centro Hospitalar de São João, E.P.E.) - e o Serviço de Urgência do Centro Hospitalar do Tâmega e Sousa, E.P.E. - um serviço de urgência polivalente de um hospital secundário. Pretende ainda comparar os episódios de urgência psiquiátrica na unidade metropolitana em função da sua proveniência.

Foram avaliados todos os episódios de urgência psiquiátrica nas duas unidades hospitalares durantes os anos de 2015 e 2016 (27532 episódios na UMPP, 11257 episódios no CHTS) através de dados administrativos recolhidos eletronicamente.

Foram encontradas diferenças estatisticamente significativas entre os dois serviços de urgência no volume diário de episódios (37,7 na UMPP vs 15,4 no CHTS); em características sociodemográficas dos doentes (maior proporção de episódios por doentes isentos de taxa moderadora no CHTS, bem como de doentes com maior proximidade ao hospital); na distribuição semanal dos episódios; no fluxograma, discriminador e cor de pulseira da Triagem de Manchester; na distribuição dos diagnósticos de Alta; nos destinos de Alta; na proporção de episódios por Utilizadores de Elevada Frequência (13,5% na UMPP vs 4,1% no CHTS); nas Readmissões (às 72h, 7,4% na UMPP vs 2,4% no CHTS); nos tempos de espera Triagem-observação (23,3 minutos superior no CHTS) e Observação-alta (7,3 minutos superior no CHTS).

Este trabalho revela diferenças relevantes em vários domínios na orientação de urgências psiquiátricas em dois modelos distintos de serviço de urgência. Destaca-se a maior frequência de episódios por Utilizadores de Elevada Frequência e de Readmissões no serviço de urgência psiquiátrica, sugerindo que este possa estar mais sujeito a uso indevido desta estrutura.

Estes resultados permitem uma melhor compreensão da dinâmica das urgências psiquiátricas e dos serviços de urgência, que poderão contribuir para alterações que procurem garantir maior eficácia e eficiência dos serviços de saúde.

# ABSTRACT EN

Through the last decades there has been a progressive increase in emergency department episodes by psychiatric conditions. This demand has led to the development of various models of psychiatric emergency departments. In Portugal, there are several psychiatric emergency departments, however, there is still a relevant volume of mental health crisis being managed in general emergency departments, without specialized psychiatric care.

This work aims to compare psychiatric emergencies in two different emergency department models in the North of Portugal: Urgência Metropolitana de Psiquiatria do Porto – a metropolitan psychiatric emergency department within a tertiary hospital (Centro Hospitalar de São João, E.P.E.) – and the emergency department of Centro Hospitalar do Tâmega e Sousa – a general emergency department within a secondary hospital. It further aims to compare psychiatric emergencies in the metropolitan unit according to their origin.

All psychiatric emergencies from 2015 and 2016 were analyzed in the two units (27532 episodes at UMPP, 11257 episodes at CHTS), using electronically collected administrative data.

Statistical significant differences were found between the two units in terms of daily usage (37,7 episodes at UMPP vs 15,4 at CHTS); patients' sociodemographic characteristics (higher proportion of episodes by patients exempted of co-payments at CHTS, as well as by patients living closer to the ED); episodes' distribution by weekday; Manchester Triage System flowchart, discriminator and bracelet color; distribution of discharge diagnosis; distribution of discharge destination; proportion of episodes by Frequent Users (13.5% at UMPP vs 4.1% at CHTS); Readmissions (at 72h, 7.4% at UMPP vs 2.4% at CHTS); times of Triage-observation (23.3 minutes longer at CHTS) and Observation-discharge (7.3 minutes longer at CHTS).

This work reveals several important differences between two different emergency department models regarding psychiatric emergencies. Higher frequency of episodes by Frequent Users as well as higher frequency of Readmissions at the psychiatric ED might point to greater susceptibility to misuse in this unit.

These results contribute to better understand the dynamics of psychiatric emergencies and emergency departments, which may be of use to future changes in health care services, in order to achieve better efficacy and efficiency.

# CRISIS IN MENTAL HEALTH

## DEFINITION

As proposed by Caplan (1964) in his *Crisis Theory*, a crisis is a time limited response to a life event, which is not solvable with a person's usual coping mechanisms. According to Caplan, in crisis, diagnosis is considered less important and irrespective of symptoms and diagnosis, treatment focused on problem-solving techniques and involving members of the patient's social network (Hubbeling & Bertram, 2012).

Many definitions have been now proposed for mental health crisis. Approaches include self-definition (the service users define their own experience), risk-focused definition (individuals at risk of harming themselves or others), theoretical definitions, and negotiated definitions (decisions reached collaboratively by service user, carer or professional) (Paton et al., 2016). Following a pragmatic service-oriented approach, crisis brings the service user to the attention of crisis services, for example through the relapse of an existing mental health condition, resulting in a substantial impact on the life of the service user and their social network (Joint Commissioning Panel for Mental Health, 2013). Mind (2011) defines mental health crisis when an individual is in a mental or emotional state where he needs urgent help.

In the London Mental Health Crisis Commissioning Guide (London Strategic Clinical Networks, 2014), crisis is described as a change in mental wellbeing that is likely to lead to an unstable or dangerous situation for the individual concerned. Terms such as 'emergency care', 'urgent care', 'crisis care', 'unplanned care' and 'unscheduled care' have been used to describe services developed to support and treat those presenting in crisis.

To clarify the terminology, which has frequently led to confusion amongst providers, commissioners, service users and carers, a British National Health Service (NHS) Department of Health Guidance (The Department of Health, 2004) clarified terms as: **Emergency care** – An immediate response to time critical healthcare need; **Urgent care** - The response before the next in hours or routine (primary care) service is available; **Unscheduled care** – Involves services that are available for the public to access without prior arrangement where there is an urgent actual or perceived need for intervention by a health or social care professional.

The wider definition of 'mental health crisis' emphasizes the notion that each person's perception of what constitutes a crisis is individual and reflects their history and social support network (Mental Health Foundation, 2008). Thus, people will respond differently to clinical situations which objectively appear similar, some finding the situation to be manageable, others finding it overwhelming (London Strategic Clinical Networks, 2014).

For clinical purposes, Bulbena & Martin (2006) propose that a psychiatric emergency (PE) might be defined as a 'situation in which the psychopathological symptoms or a behavior disorder […] are perceived as threatening for the patient, his family, or others, so that they demand urgent psychiatric intervention'.

According to this notion, Zeller (2010) summarized the most prevalent PE presentations:

**Suicide attempt/ideation**: Wasserman (2001) states that suicidal behaviors can be conceptualized as a complex process that can range from suicidal ideation (which can be communicated through verbal or non-verbal means) to planning of suicide, attempting suicide, and in the worst case, suicide. Suicidal behaviors are influenced by interacting biological, genetic, psychological, social, environmental and situational factors. In a large study from US Emergency Departments, from 1992 to 2001, visits for suicide attempt and self-injury increased by 47%, from 0.8 to 1.5 visits per 1000 US population (Larkin, Smith, & Beautrais, 2008).

**Agitation, violent or disruptive behavior**: can be concisely described as "excessive verbal and/or motor behavior" (Citrome, 2002) and may be associated with multiple medical and psychiatric disturbances. A study from 2005 estimated that 20% to 50% of total PE visits might involve patients at risk for agitation (Marco & Vaughan, 2005). Allen & Currier (2004) suggest that, in the US, as many as 1.7 million medical Emergency Departments (ED) contacts per year might involve agitated patients.

**Psychosis Leading to Dangerous Behavior or Thoughts**: psychotic symptoms, as hallucinations, thought or behavioral disorganization or delusions might not represent a PE for itself, but may lead the patient to dangerous behavior or thoughts

that can, on their turn, represent serious risk, mainly for suicidal ideation or agitation/violent behavior (Pandya, Larkin, Randles, Beautrais, & Smith, 2009).

**Mania** - This phase of the Bipolar Disease spectrum can run with psychotic symptoms, energy increase, insomnia, impulsivity, and grandiosity, often producing poor judgment which may lead to dangerous behavior or inability to care for themselves (Zeller, 2010).

**Intoxication states** - Severe acute intoxications (alcohol, abuse drugs, or other substances) are primarily a medical (organic) emergency and must be dealt with by medical emergency personnel. However, intoxications often lead to suicidal or homicidal threats, or exacerbate symptoms of another chronic mental illness. In an epidemiological study from US emergency departments, primary diagnosis of substance abuse was responsible for 27% of psychiatric-related visits (Hazlett, McCarthy, Londner, & Onyike, 2004).

**Anxiety** - Anxiety-related presentations accounted for 16% of emergency department mental health visits from 1992–2001 in a US sample (Smith, Larkin, & Southwick, 2008). Although it doesn't fulfill the premises of dangerousness for the patient or others, thus not being considered a PE *per se*, anxiety can sometimes be experienced so intensely that the patient deals with it as an emergency.

**Other Common Presentations and Exclusions** - Many patients seek help in emergency department for personal crisis, such as family and interpersonal conflicts, financial difficulties, social deficiencies, unemployment, etc. These situations, by themselves, do not represent a PE, unless they conduct to the previous considered conditions (suicidal thoughts, agitation, etc.). However, they represent a large number of ED visits, mainly seeking for psychological counseling, access to social services or other referrals (Zeller, 2010).

# MENTAL HEALTH CRISIS SERVICES

## EVOLUTION

The movement of deinstitutionalization started in the decades of 1950-60 became one of the most important hallmarks of modern Psychiatry (Pow, Baumeister, Hawkins, Cohen, & Garand, 2015). Patient's discharge from long-stay psychiatric hospitals to community structures, along with other structural changes in psychiatric services (mainly the reduction of available inpatient beds) and transformations in demographic and socioeconomic factors increased the number of patients with severe and enduring mental illness living in inner city areas with limited access to supportive services and, in the beginning of the 1990s (Curry, 1993). These factors, associated with inadequate community resources, the large numbers of uninsured individuals, and other causes, have been promoting an ongoing rise of emergency department presentations of mental health patients (Hazlett et al., 2004). As a result, the management of psychiatric emergencies has progressed into a subspecialty in its own right (Zeller, 2010).

According to Larkin et al. (2005), between 1992 and 2001, there were 53 million mental health-related emergency department contacts in the United States, representing an increase from 4.9% to 6.3% of all emergency department visits. In Germany, Pajonk et al. (2008) concluded that PE accounted for 10–15% of all calls in the German physician-based Emergency Medical Services. In another report from German EDs, PE were reported to have a prevalence of 7.7%, with Psychiatry being the fourth most frequent discipline in the EDs (Kropp et al., 2007).

In 2004, Pajonk et al. (2004) suggested some reasons for the increase of PEs in the previous 10 years in Germany: expanded indication to call an emergency physician (EP); reduced availability of family physicians; increased level of psychosocial stress (e.g., due to increased rates of unemployment and debt); isolation due to increased rates of divorce, family structures breakup and a high number of single homes; increase in psychiatric morbidity subsequent to survived life-threatening illness or injury; excessive aging of the population with multimorbidity and use of polypharmacy; huge increase in binge drinking in young adults.

The demands made by these patients on staff time and facilities, together with the general growth in ED attendances highlighted the need for specialist mental health knowledge and skills available in these departments (Kendrick, 1996; Younger, 1995).

Once the psychiatric emergency ward has become a primary entry point into the network of mental health services, the 'Triage Model' was conceptualized, in the 1980's, and was based upon the premises of rapid evaluation, containment and referral (Gerson & Bassuk, 1980). According to Zeller (2010), two methods derived from the Triage Model: the psychiatric consultant seeing patients in the medical emergency department, and a separate section of the medical emergency department dedicated to mental health patients, with specially-trained and dedicated staff. Following other concept, there is a third major model: Psychiatry Emergency Service (PES) model.

## CONSULTANT IN MEDICAL EMERGENCY DEPARTMENT (LIAISON MODEL)

This is the most common model in the US. In this design, a mental health professional consults patients in a medical emergency department. Although preferably a psychiatrist, in many systems the consultants are psychologists, advanced registered nurse practitioners, social workers, or licensed marriage/family therapists.

All patients are initially evaluated by an emergency physician, allowing organic causes of psychiatric symptoms to be excluded or treated before psychiatric consultation. Aside from being the cheapest and easiest model to implement in a medical emergency department, it has the advantage of allowing mental health patients to be treated in the same setting of the other patients, reducing the possibility of stigmatization.

The absence of permanent mental health professionals at the ED conduces to greater times of await (that may take several hours), during which the patient may be receiving little or no treatment. Usually, after consultation, the decision is usually restricted to the choice either to admit for psychiatric hospitalization or to discharge, since the emergency department setting is likely not conducive to extended psychiatric treatment and observation. Moreover, the physical setting of the ED is not frequently the most adequate for a person in a mental health crisis. Additionally, many emergency department staff may be undertrained in mental illness. It can occur, in busy emergency

departments, to disregard psychiatric patients, resulting in poorer care and pressure to discharge them.

The use of non-psychiatrist consultants restricts the ability to recommend medications or to accurately diagnose other organic conditions such as delirium. However, the mental health nurse practitioner (MHNP) role based in the ED has emerged as a means of streamlining access to mental health intervention and supporting ED staff in providing more holistic care (Wand, White, Patching, Dixon, & Green, 2011).

Several institutions in the UK followed an US approach, introducing psychiatric liaison nurses to their ED (Sinclair et al., 2006). A 2004 NICE Clinical Guideline recommended that mental health professionals should be integrated into emergency departments to improve psychosocial assessment and provide training for non-mental health professionals working in the emergency department, suggesting that experienced psychiatric nurses have the skills and knowledge to provide appropriate clinical assessment and make management decisions in the ED setting (National Institute for Clinical Excellence, 2004). Several years earlier, Catalan et al. (1980) supported the idea that nurses can be as effective as psychiatrists in the assessment and management of deliberate self-poisoning patients. Hussein et al. (1997) also presented encouraging evidence of nurses undertaking clinical assessments in acute psychiatric settings and reaching similar decisions to their medical colleagues on diagnosis and treatment programs.

Several articles described mental health liaison services as operating "successfully" in emergency departments (Beech, Parry, & Valiani, 2000; Brendon & Reet, 2000; Callaghan, Eales, Leigh, Smith, & Nichols, 2001; Clarke & Hughes, 2002; McDonough et al., 2004).

### DEDICATED MENTAL HEALTH WING OF MEDICAL EMERGENCY DEPARTMENT

According to Zeller (2010), this model improves on classic consultation model by providing a separate, often more nurturing and calming environment. It is frequently staffed by nurses or other professionals with extra training in mental health, allowing for more focused and appropriate care for individuals in crisis, and thus avoiding some of the pitfalls that may confront the psychiatric patient in the general emergency room.

Since its location is within a medical emergency department, patients can receive full medical history and physicals as part of their evaluation. Additionally, because of the separate setting, there may be less urgency to move patients out and therefore permit time for medications and interventions to have effect prior to disposition decisions.

## THE PSYCHIATRY EMERGENCY SERVICES MODEL

Woo et al. (2007) state that while the consultation model had been the mainstay for psychiatric emergencies in the 1980s (Lee, Renaud, & Hills, 2003), as the population of the mentally ill continued to rise, the psychiatric emergency service (PES) model has emerged as a solution to the upsurge (Allen, 1999). According to the former author, a typical PES follows the 'Treatment Model', where in addition to 'Triage Model' capability, many patients can also be treated to the point of stabilization onsite (Allen, 1996). Zeller (2010) describes the PES as classically a stand-alone program dedicated solely to the treatment of individuals in mental health crisis. Such facilities can either be locked, unlocked, or a combination of the two, and located in-hospital or community based (ideally situated near a medical emergency department).

Typically, a PES has a 24-hour available mental health staff, with psychiatric nurses, other mental health professionals, and psychiatrists either onsite or readily available. This environment allows diagnosis and treatment to be proceeded far more promptly than in the other models. In a PES, a patient's psychiatric treatment can begin without delay, with the potential to achieve quick stabilization. For more complicated patients, many PESs have extended observation capability, allowing treating patients for longer periods, which can often be sufficient for many patients to stabilize and thus avoiding inpatient hospitalization.

In a 1989 study, Gillig et al. (1989) observed that extended observation lowered inpatient admission rates over a program using the Triage Model from 52% to just 36%. More recently, Woo compared (2007) compared a US PES model with the previous Consultant Model, concluding that timeliness of psychiatric evaluation, as defined by the time elapsed between the documented triage time and time of evaluation completion by psychiatrists, improved by 48.4%, the amount of emergency medication given decreased by 27.0%, elopement by 61.5% and seclusion and restraint by 60.0%; he found no

statistical significant differences in urine toxicology ordered, follow-up care provided and readmission rate after 30 days.

Zeller (2010) adds that a PES can be advantageous for medical emergency departments in decompression of overcrowding, allowing psychiatric patients to be transferred for their evaluations and treatment rather than waiting for consultants to arrive at a facility or an inpatient bed to become available. Many PES programs can also accept ambulances, police deliveries, and self-referrals directly, allowing crisis patients to avoid medical emergency departments completely.

Although this model is more expensive than the previous, with the cost of 24/7 staffing and of maintaining its own physical plant, if it implemented in facilities or communities seeing large numbers of acute psychiatric patients per month, it can more than justify its value by minimizing unnecessary inpatient admissions and shortening lengths of stay.

## TREATMENT GOALS OF EMERGENCY PSYCHIATRY

A high proportion of mental health patients presenting to medical emergency departments with psychiatric complaints have co-existing medical illnesses or an undiagnosed medical condition (Carlson, Nayar, & Suh, 1981), which can lead to serious morbidity if failed to identify (Hall, Popkin, Devaul, Faillace, & Stickney, 1978). Therefore, the first step (triage) of a psychiatric emergency is to rule out any threatening organic condition. In some ED models, this procedure is always made by an emergency physician since all the patients first run through a triage procedure.

Simultaneously, the risk of violence must be assessed to preserve the safety of the patient, family, other patients and ED staff.

After ensuring patient's medical stability, managing of the acute crisis follows. Frequently, this will involve medications, although sometimes brief support psychotherapy can also be sufficient. The patients who are not able to be stabilized in the emergency setting will need inpatient admission to resolve the acute condition.

To achieve the best outcomes possible, it is very important that crisis professionals treat patients in the least restrictive setting, avoiding coercion and manage

patients in a supportive, caring, and interpersonal manner, creating with them what is known as a therapeutic alliance (Zeller, 2010).

The last, but still essential step is to provide the patient an appropriate care plan for post-discharge: patients can be hospitalized, referred to psychiatric/psychological urgent or regular appointments, general practitioner (GP) appointments, substance abuse programs, or other solutions available in the area. Referral to social care is fundamental in many situations. Psychoeducation, giving instructions to deal with future crisis episodes, must not be forgotten.

# OUTCOMES IN PSYCHIATRY EMERGENCY DEPARTMENTS

## HOSPITALIZATION

An increased focus on providing care in community settings has taken place in developed countries in recent decades (Sabes-Figuera et al., 2016). The policy of redirecting the public health-care budget for long-term assistance of people with chronic and disabling mental-health needs (Lieberman, Dixon, & Goldman, 2013) and the fiscal restrictions pressured health-care providers to reduce hospitalizations and lengths-of-stay (Sharfstein & Dickerson, 2009). Therefore, the number of psychiatric beds decreased in most European countries in recent years (Knapp et al., 2008). Despite this trend, psychiatric hospital inpatient services remain an important element of the mental health care system. In 2010/11 in England, investment in inpatient care for working age adults was estimated to be £2 billion, representing 38 % of all direct investment for this population (Mental Health Strategies, 2011).

In Portugal, in the year 2005, hospitalization represented nearly 83% of the public costs in mental health, whilst in the global National Health Service it accounted for 56% (Comissão Nacional para a Reestruturação dos Serviços de Saúde Mental, 2007).

Most of the developed countries worldwide implemented policies seeking to reduce inpatient admissions. This indicator is widely used as an outcome to evaluate the efficacy and efficiency of health-care policies.

## READMISSIONS

Although readmission rates have not been universally accepted as an accurate measure of quality of care (Madi, Zhao, & Li, 2007), they bring implications for health care costs, patient quality of life, overall health care cost burden, and health care workers' morale. As such, readmission rates most likely will be an indicator of quality tied to reimbursement and will assume a central role in health care system's quality improvement initiatives (Adams & Nielson, 2012). Chan & Ovens (2002) also point that readmissions often do not lead to any improvement in health outcomes and sometimes are associated with negative attitudes. Given these findings, in 2009, British Department of Health defined readmission reduction to general hospitals as a new target (Tadros et al., 2013).

According to Adams & Nielson (2012), many factors contribute to a psychiatric patients' need to return to the emergency department including treatment non-compliance, outpatient provider unavailability, and a patient's inability to manage their illness symptoms. Noncompliance with aftercare plan often leads to high rates of readmission to the ER (Bruffaerts, Sabbe, & Demyttenaere, 2004, 2005). In 1977, Del Gaudio et al. (1977) already concluded that only 41.8% of PE discharged patients completed their referral.

Bruffaerts and colleagues (2004) suggest that for some patients, readmission might be more highly influenced by health-system characteristics (as lack of aftercare plan, brevity of inpatient stay, and discharge against medical advice) than the severity of their illness.

A study in the US analyzed the implementation of a 'Comprehensive Psychiatric Emergency Program', which combines a psychiatric emergency department and an observation unit with a mobile crisis unit, interim crisis unit, and crisis residence. The goal was to ensure patient compliance with follow up and ease in arranging services, providing an immediate appointment, providing close follow up, and ensuring a collaborative and interdisciplinary approach that addresses the patients' biopsychosocial needs. Patient outcomes improved and readmissions decreased in the population using the program. Fifty-five percent of the patients who were seen through this program were either successfully connected with outpatient providers or were no longer in need of services (Simakhodskaya, Haddad, Quintero, & Malavade, 2009).

### WAITING TIMES

Waiting times in emergency departments are major concern in many countries, and to deal with this problem, policymakers in Canada, Australia, and England have instituted health reforms that include setting targets for the time patients spend in the department (Guttmann, Schull, Vermeulen, & Stukel, 2011).

According to Moshin (2007) , long waiting times can delay every stage of the visit, from initial assessment, to treatment, or final decision making, and can alter clinicians' routines and decision making. It is also associated with delays in time sensitive treatment for serious medical conditions typically requiring admission to hospital (Diercks et al., 2007).

A Canadian study on the association between waiting times and short-term mortality concluded that the risk of adverse events increased with the mean length of stay of similar patients in the same shift in the emergency department. Presenting to an emergency department during shifts with longer waiting times, also reflected in longer mean length of stay, is associated with a greater risk in the short term of death and admission to hospital in patients who are well enough to leave the department (Guttmann et al., 2011).

Patients with psychiatric and drug- or alcohol-related complaints may represent a disproportionate number of longer wait times in the ED (Wartman, Taggart, & Palm, 1984). A 2004 multi-institutional survey found that psychiatric patients from EDs without psychiatric consultation had a waiting time two times longer (Mulligan, 2004).

### FREQUENT USERS

Patients frequently attending hospitals have been estimated to cost UK health services approximately £2.3 billion every year (Syed N, 2007). Research suggests that there are almost half a million frequent attendees in the UK and over a million emergency admissions to hospitals annually (Sampson, Blanchard, Jones, Tookman, & King, 2009).

In a study from 2006, Zeman & Arfken (2006) concluded that between 20–40% of all emergency department psychiatric visits are unnecessary. Frequent visitors are estimated to account for as many as one-third of all visits to psychiatric emergency services (Ellison, Blum, & Barsky, 1986), contributing to a large proportion of these unnecessary visits. Staff members may feel antagonized by these frequent visitors (Arfken, Zeman, Yeager, Mischel, & Amirsadri, 2002), who take up space and time needed for attending to all patients, and this antagonism may lead to poor rapport and negative expectations as well as over and undertreatment (Arfken et al., 2004).

Several studies have found that risk factors for frequent visitors include higher rates of psychiatric hospitalization and lower levels of access to resources (Bassuk & Gerson, 1980; Dhossche & Ghani, 1998; Ellison et al., 1986; Hansen & Elliott, 1993; Klinkenberg & Calsyn, 1997; Munves, Trimboli, & North, 1983; Purdie, Honigman, & Rosen, 1981; Saarento, Hakko, & Joukamaa, 1998; Slaby & Perry, 1980).

In a study comparing frequent to infrequent Psychiatric ED visitors, Arfken and al. (2004) found that frequent visitors had greater utilization of inpatient and outpatient behavioral health services, general emergency services, and crisis residential services in the 12 months before the index visit and greater utilization of general emergency services and psychiatric emergency services in the three months after the index visit. Frequent visitors' median financial charge for those services was $16,200 greater (5.9 times greater) than that of infrequent visitors. They concluded that frequent visitors represent socially unfavoured persons who have high levels of utilization of health care facilities besides psychiatric emergency services.

## LEFT WITHOUT BEING SEEN

For Hsia et al., (2011) the proportion of patients who leave without being seen (LWBS) in the emergency department is an outcome-oriented measure of impaired access to emergency care and represents the failure of an emergency care delivery system to meet its goals of providing care to those most in need. In this study, they concluded that visitors to different EDs experience a large variation in their probability of leaving without being seen, and visitors to hospitals serving a high proportion of low-income and poorly insured patients are at disproportionately higher risk of leaving without being seen.

The definition of LWBS varies across studies. For instance, while Bassuk & Gerson (1980) considered more than one ED visit within one year, Arfken et al. (2004) consider more than six visits within one year.

Although representing a relatively small number of patients, LWBS patients have a disproportionately contribution for the amount of ED work and global health care costs (Hsia et al., 2011; Saarento et al., 1998; Sullivan, Bulik, Forman, & Mezzich, 1993; Sun, Binstadt, Pelletier, & Camargo, 2007).

In a study from 1986, about half of the patients who did not receive a timely evaluation in an emergency department left without treatment (Weissberg, Heitner, Lowenstein, & Keefer). Moshin et al. (2007) calculated that the frustration with long waits can cause up to 10% to leave without being seen.

Several studies led to the conclusion that the proportion of annual hospital-level LWBS visits is the amalgamation of all individual ED visitors' decisions to leave without being seen or not and is often used as a marker of ED crowding and is associated with longer waits (Baker, Stevens, & Brook, 1991; Bindman, Grumbach, Keane, Rauch, & Luce, 1991; Rowe et al., 2006).

Although previous studies suggest that a relevant proportion of LWBS patients are seriously ill and are at risk of poorer outcomes, thus requiring immediate evaluation (Baker et al., 1991; Rowe et al., 2006), in a 2011 large cohort study by Guttmann et al., (2011) patients who left without being seen were not at higher risk of short term adverse events.

# MENTAL HEALTH IN PORTUGAL

## EPIDEMIOLOGY

The *Portugal National Mental Health Survey, 1st report* (Caldas-de-Almeida & Xavier, 2010) is the Portuguese contribution to the World Health Organization 'Mental Health Surveys Initiative (WMHSI)', coordinated by Ronald Kessler (Harvard Medical School). It was the first large-scale mental health epidemiological study conducted in Portugal.

The results showed that psychiatric disorders have a high prevalence in Portugal - 1 in 5 individuals presented any kind of psychiatric disorder in the previous 12 months – the second higher prevalence in Europe, after Northern Ireland, and considerably far from other southern European countries, which, without no exception, presented much higher prevalence than the northern ones (Wang et al., 2011). The lifetime prevalence for, at least, one psychiatric disorder was 42.7%, only surpassed by the US (47.4%). Spain and Italy, for instance, had their values at, respectively, 19.4% and 18.1%.

The disorders with higher lifetime prevalence were major depressive disorder (16.7%), specific phobias (10.6%) and alcohol abuse (10%). Anxiety disorders were the diagnostic group with higher prevalence, followed by affective disorders (19.3%).

Higher prevalence was found amongst women, younger ages (18-34 years), divorced and widowed. Whereas in women depressive and anxiety disorders are more common, in men there are impulse control disorders and substance abuse. People with lower educational level also present more impulse control and substance abuse disorders.

The results also highlighted that, on the one hand, 15% of the sample got psychiatric health care in the previous year, mainly in primary care settings. On the other hand,, the majority (65%) of people with some kind of mental health disorder didn't get any mental health care in the previous year, mainly the less severe situations. However, considering the health care access for the severe patients, Portugal performed 3rd in an European study (Wang et al., 2011).

In contrast, a relevant group of people who accessed to mental health care in the previous year did not present any psychiatric disorder, following diagnostic criteria from

DSM-IV. Although these persons could present some level of suffering, these numbers point out to a mal-use of health care services.

The median waiting time between the onset of the disease and the access to health care was about 4 years for major depressive disorder and 2 to 3 years for generalized anxiety disorder and panic disorder.

Global Burden of Diseases, Injuries, and Risk Factors (GBD)(Institute for Health Metrics and Evaluation, 2010) data from 2010 reveals that in Portugal, mental and behavior disorders account for 11,75% of Disability-Adjusted Life Years (DALY) and for 20,55% of Years Lived with Disability (YLD).

Relevant epidemiological research in Portuguese psychiatric EDs is scarce. A report from Direcção-Geral da Saúde (Direcção-Geral da Saúde, 2010) (the central public healthcare department in Portugal) calculated that in 2008 psychiatric emergencies represented 0,04% of the total ED visits in Portugal (including ED with and without psychiatric ED and primary care) However, there are some reports on local units: a 2010 report from a metropolitan ED revealed that psychiatric emergencies counted for 6,6% of the ED total visits (Polido, 2011). Another analysis in the same unit revealed that anxiety accounted for 16,2% of the total psychiatric ED visits, substance abuse 11,3% and suicidal behavior for 9,7% (Pereira, 2011).

In 2013, Alves (2013) studied a sample of 210 psychiatric visitors from a metropolitan psychiatric ED. 66,2% of the patients were women and mean age was of 45 years; 57% of the patients were exempt of co-payments; 51,4% weren't having psychiatric regular follow-up and 47,1% of those with regular follow-up had at last a consultation in the previous month; 54,7% of the total sample had at least one psychiatric hospitalization in the previous year. The principal causes for admission were anxiety (53,8%), depressed mood (48,1%), suicidal behavior/thoughts (32,4%), substance abuse (16,7%) and aggressiveness (15,7%). The most prevalent diagnosis at discharge were Adjustment disorder (28%), Depressive disorder (14%), Psychosis not otherwise specified (10%), Dementia/delirium (8%) and anxiety disorders (7%).

This study also concluded that only 9,5% of the patients were referred from primary health care, suggesting poor communication between these players in the health care chain. Data also underlined high waiting times for specialized consultation, poor

continuity of care in ambulatory, difficulties in scheduling appointments, barriers in the access of ambulatory care after hospitalization, aspects that make the emergency department a most accessible structure for health care. About 21% of the patients were discharged to inpatient units. Most visits (54,3%) weren't considered urgent.

The National Plan for Mental Health 2007-2016 also mentioned that the preferential access to the psychiatric ED suggested difficulties accessing specialized ambulatory health care (Coordenação Nacional para a Saúde Mental, 2008).

## PSYCHIATRIC EMERGENCY DEPARTMENTS IN PORTUGAL

In 2001, the Portuguese government published a document (Rede de Referenciação Hospitalar de Urgência/Emergência) that defined the national network for referral within the diverse emergency departments across the country. This document didn't include a reference network for mental health emergencies. In 2004, the document was updated and dispositions were made upon psychiatric emergency departments (Direcção-Geral da Saúde, 2004).

The document mainly formalizes the pathway through the already existent structures. The models used by each hospital vary substantially depending on the staff availability, visits demand and administration policies. Across the nation, not all local hospitals have a psychiatric ED/liaison team; where they exist, teams could work for 24 hours, 12 hours a day or less; could work all-week or just on working days; could be on prevention some periods, mainly at night; could receive direct admissions to the ED, or just by referral after previous medical evaluation.

Globally, each major metropolitan area in Portugal had one or more central ED that accepted 24/7 referred patients from minor structures, organized hierarchically, in case these didn't have an available psychiatric unit for evaluation when the patient arrived. The distance between these departments could vary from less than 10 kilometers to 100 to 200 km.

Nowadays, this structure remains mainly the same, although there is a tendency to further centralize the psychiatric ED within a big metropolitan area.

In 2015, a work group from the Portuguese Health Department published a document in which were defined entities called Local Mental Health Services (Serviços

Locais de Saúde Mental) responsible for the integration of mental health care of a community within a geographical sector with 50.000 to 200.000 inhabitants; those services should be responsible for permanent admission of psychiatric emergencies, located into the global ED or other structure for crisis intervention (Ministério da Saúde, 2015).

# OBJECTIVES

The increasing access to psychiatric emergency departments led to the development of various models of functioning through the last decades.

Improving accessibility and promoting better care to the mental health patient generated greater allocation of human and structural resources in the psychiatric ED, achieving better results, mainly shortening waiting times and inpatient admissions. However, higher accessibility also eases access for those who use the ED as a bypass of the health care delivery system, seeking for a quicker, more convenient visit.

**This work aims to compare psychiatric emergencies in two different emergency department models in the north region of Portugal.** For that purpose, the researchers intend to describe psychiatric emergency episodes of 2 different emergency departments (Centro Hospitalar de São João – CHSJ, and Centro Hospitalar do Tâmega e Sousa - CHTS) in terms of:

1.1. volume of use and user's sociodemographic characteristics;

1.2. the severity and indicators of performance.

# SETTING

## OVERVIEW

Public health care in continental Portugal is managed by 5 regional administrations (Administrações Regionais de Saúde) that coordinate the public health care structures in each of five major geographical areas in Portugal: Norte, Centro, Lisboa e Vale do Tejo, Alentejo and Algarve.

The north region of Portugal (NUTS II) has a territorial extension of 21.285,9 $km^2$ (about 23,1% of the country's area, the third largest) and a resident population of 4.771.788 individuals (37% of the continental population, the largest population in the country) (Instituto Nacional de Estatística, 2011). This region comprises the districts of Viana do Castelo, Bragança, Vila Real, Braga, Porto, and the north part of Aveiro, Viseu and Guarda.

There are 13 hospital centers in this region (some of them with various units, geographically dispersed): Centro Hospitalar Póvoa de Varzim/Vila do Conde, EPE (Public Enterprise Entity); Centro Hospitalar Entre Douro e Vouga, EPE; Centro Hospitalar Médio Ave, EPE; Centro Hospitalar Porto, EPE; Centro Hospitalar Tâmega e Sousa, EPE; Centro Hospitalar Trás-os-Montes e Alto Douro, EPE; Centro Hospitalar de Vila Nova de Gaia/Espinho, EPE; Hospital da Senhora da Oliveira Guimarães, EPE; Centro Hospitalar de São João, EPE; Hospital Santa Maria Maior, EPE; Hospital de Braga; Unidade Local de Saúde do Nordeste, EPE; Unidade Local de Saúde de Matosinhos, EPE; Unidade Local de Saúde do Alto Minho, EPE; Instituto Português de Oncologia Francisco Gentil, EPE; Hospital Magalhães Lemos, EPE.

Of these, only five have a psychiatry emergency department: Unidade Local de Saúde do Alto Minho, EPE (Unidade Hospitalar de Viana do Castelo); Unidade Local de Saúde do Nordeste, EPE (Unidade Hospitalar de Bragança); Hospital de Braga; Centro Hospitalar Trás-os-Montes e Alto Douro, EPE (Unidade Hospitalar de Vila Real); Centro Hospitalar de São João, EPE (Unidade Hospitalar do Porto). The hospital network allows the transference of mental health patients, when needed, from units without psychiatric ED to the closest psychiatric ED available at the time.

## CENTRO HOSPITALAR DE SÃO JOÃO, EPE.

Centro Hospitalar de São João, EPE., is a tertiary hospital center, the biggest in northern Portugal and the second in the country. It is composed by two units, Hospital de São João – Porto, and Hospital de Valongo. For many tertiary procedures, it is the reference unit for most of the northern Portugal population, and is also the reference primary and secondary hospital for part of the population of Porto and some neighbor councils.

This polyvalent ED has within a psychiatric emergency unit – Urgência Metropolitana de Psiquiatria do Porto (UMPP) – a metropolitan psychiatric ED, working since 2006. It provides psychiatric emergency care to the population from the reference geographic area of Centro Hospitalar de São João, Centro Hospitalar do Porto, o Centro Hospitalar do Tâmega e Sousa, o Centro Hospitalar do Médio Ave, o Centro Hospitalar de Vila Nova de Gaia/Espinho, o Centro Hospitalar Póvoa de Varzim-Vila do Conde, o Centro Hospitalar Entre Douro e Vouga, a Unidade Local de Saúde de Matosinhos and Hospital de Magalhães Lemos. This psychiatric ED serves a geodemographic area of about 3.000.000 inhabitants from 27 councils.

UMPP is available 24 hours a day, every day of the year, and it receives patients from 4 possible ways:

1. Directly from the exterior (open-door), for patients with Manchester Triage System flowchart: **self-harm**, **mental problems**, **strange behavior**. This includes patients in Portugal's Mental Health Act;
2. Referred from the hospitals included in the UMPP;
3. Referred from other northern Portuguese hospitals, in periods where there is no psychiatric ED (Centro Hospitalar de Trás-os-Montes e Alto Douro and Unidade Local de Saúde do Nordeste at weekends and 0:00h to 8:00h at week);
4. Referred directly from any other public or private health institution in the geographical area of assistance.

There are 8 medical teams, composed by psychiatrist and psychiatry residents from the hospital units integrating the UMPP, responsible for a 24-hour period, weekly,

and a rotating weekend shift. The composition of each team, although ruled by some directives, presents relevant variability.

Physically, the ED it has a space within the general ED and shares its logistics. It has 2 consultation rooms, 1 nurse room and an observation room.

Governmental data from 2009 (Administração Regional de Saúde do Norte, 2009) conclude that UMPP has about 12.000 episodes per year.

### CENTRO HOSPITALAR DO TÂMEGA E SOUSA, EPE.

This hospital center is composed by 2 units: Unidade Padre Américo, in Penafiel and Unidade Hospital de Amarante. It is a secondary center, so patients needing tertiary care in certain medical specialties are referred to Centro Hospitalar de São João.

CHTS is the reference hospital center for a population about 520.000 individuals (the second largest population in the country) from 12 different counties of 4 different districts.

Unidade Amarante has a basic emergency department, and Unidade Padre Américo has a polyvalent ED. Both EDs work 24 hours-a-day, all-year, in an open-door model.

Until February 2011, CHTS had a psychiatry ED in a consultation model, working from 8:00h to 20:00h., only in weekdays. In the periods without available psychiatric ED, the patients needing specialized psychiatric management were transferred to the psychiatric ED in CHSJ (UMPP since 2006). From February 2011 on, CHTS joined UMPP, and its psychiatrists and psychiatry trainees form a team within UMPP.

Since then, both CHTS EDs don't have a specific psychiatric area. They receive psychiatric emergencies from the exterior, which are managed by a general ED physician. When specialized psychiatric management is needed, the general physician transfers the patient to UMPP.

# METHODS

This thesis has an observational and descriptive nature.

For the first objective, all psychiatric emergency visits at UMPP and CHTS occurred between 1st January 2015 and 31st of December 2016 were eligible.

## ETHICS

This work was authorized by the President of the Administração Regional de Saúde Norte and the Ethics Committee of CHSJ and CHTS.

All statistical analyses were performed on SPSS 24®.

## DATA COLLECTION

Data from each ED episode was electronically collected in July 2017. Because of the different nature of the hospitals' IT systems, the operationalization of data collection was different. At **Centro Hospitalar de São João (UMPP)** data was retrieved using HVITAL, a data analysis in-house software platform, designed to automatically collect and analyse all data electronically stored (Almeida, 2016). At **Centro Hospitalar do Tâmega e Sousa,** variables were collected using ADW® and SONHO® software.

The following variables were collected:

- sex,
- age,
- admission date,
- ED discharge date,
- ED admission time,
- ED discharge time,
- waiting time between triage and first assessment,
- time between first assessment and discharge,
- MTS discriminator in the first triage,
- MTS fluxogram in the first triage,
- MTS bracelet color in the first triage,

- patient's origin,
- institution of origin,
- co-payment exemption,
- district of residence,
- county of residence,
- parish of residence,
- discharge ICD-9 principal diagnosis code,
- discharge destination,
- discharge destination institution.

Patient's File number and National Health Service number were used to match data.

Demographic data for the counties of residence was obtained from Instituto Nacional de Estatística online databases (data from 2011 national census).

### INCLUSION CRITERIA OPERATIONALIZATION

Psychiatric emergency episodes were defined as:

1. for **UMPP**, episode encoded in HVITAL database as "Area Urgência = Psiquiatria" (an episode managed in the psychiatric ED, independently of its origin or discharge destination);
2. for **CHTS**,
   i. episode with MTS flowchart of admission: **self-harm**, **mental problems**, **strange behavior** or **overdose and poisoning**
   AND
   ii. episode with MTS discriminator of admission:
      - significant psychiatric history;
      - deep anguish;
      - moderate to high risk of self-injury;
      - moderate to high risk of aggression;
      - disruptive behavior.

   OR
   iii. episode with discharge principal diagnosis (ICD-9):

- 290 to 319 – Mental Disorders;
- V11 - Personal history of mental disorder;
- V40 - Mental and behavioral problems;
- V60 - Housing household and economic circumstances;
- V61 - Other family circumstances;
- V62 - Other psychosocial circumstances;
- V69 - Problems related to lifestyle;
- E95 – Suicide and self-inflicted injury.

For objective 1.1, UMPP episodes were categorized in 3 groups according to their origin, and compared:

- Exterior (INEM; Saúde24; exterior);
- Primary care (ARS/health centers);
- Hospital transfer (other hospital; inpatient units; day hospital; outpatient units; private practice).

CHTS episodes were not categorized, since this is a secondary hospital unit, thus receiving patients mainly from the exterior (in this sample, 94.6%).

The two EDs ware compared.

For objective 1.2, UMPP visits were classified as follows:

- Without previous evaluation: INEM; Saúde24; exterior;
- With previous evaluation: ARS; health centers; other hospital; inpatient units; day hospital; outpatient units; private practice; ED.

For the same reason stated before, CHTS visits were not categorized.

### SOCIO-DEMOGRAPHICS

- Age, categorized in groups
  - 18-24 years;
  - 25-39 years;
  - 40-64 years;
  - 65-80 years;
  - >80 years.

- Sex (male and female)
- Distance to ED (the rectilinear distance between the parish of residence centroid and the hospital, calculated using ArcGis®), categorized in groups
    - <10km;
    - 10-30km;
    - 30-50km;
    - >50km.
- Exemption of co-payments (exempt vs not-exempt);

### CHARACTERISTICS OF EMERGENCY DEPARTMENT ADMISSIONS

- Number of daily visits;
- Distribution by year, week and day (time) of admission;
- Distribution by MTS flowchart
    - mental disorder;
    - strange behavior;
    - self-injury;
    - overdose and poisoning;
    - all other flowcharts were classified as 'others'.
- Distribution by MTS discriminator
    - significant psychiatric history;
    - deep anguish;
    - moderate to high risk of self-injury;
    - moderate to high risk of aggression;
    - disruptive behavior;
    - all other discriminators were classified as 'others'.
- Discharge diagnosis (ICD-9 principal diagnosis from 290 to 319, V11, V40, V60, V61, V62, V69 and E95; all others were classified as 'others');

### OUTCOME INDICATORS

- MTS bracelet color:
    - Blue and White;
    - Green;

    - Yellow;
    - Orange.
- Frequent users, defined as the proportion of patients with 4 or more ED episodes within 12 months, from index visit.
- Discharge destination:
    - Left without being seen;
    - Exterior (ARS/Health Centers, outpatient consultation, exterior not otherwise specified, others);
    - Hospitalization in psychiatry unit;
    - Hospitalization in a non-psychiatric unit;
    - Left against medical approval.
- Re-admissions:
    - 24 hours after index episode;
    - 48 hours after index episode;
    - 72 hours after index episode.
- Times:
    - Waiting time for assessment (time between the end of MTS triage and the first medical assessment);
    - Total time of assessment (time between first medical assessment and clinical discharge).

### STATISTICAL ANALYSIS

For objective 1.1, UMPP and CTHS emergency departments were compared in terms of patients' socio-demographics and characteristics of emergency department admissions; for objective 1.2, EDs were compared in terms of outcome indicators. Analyses were further stratified according the origin of admission, as stated before.

*Chi*-square ($\chi^2$) test was performed to assess differences in categorical variables and student's *t*-test or Mann-Whitney U test in continuous variables, as appropriate (normality was tested by the Kolmogorov-Smirnov test).

Statistical significance was assumed for an $\alpha$=0.05.

# RESULTS

## 1.1

## SOCIODEMOGRAPHIC VARIABLES

Urgência Metropolitana de Psiquiatria do Porto had a total 27532 episodes in the two years included in this study (5.5% of all CHSJ ED's visits in the same period), 14025 in 2015 and 13507 in 2016, with an average of 37.7 visits per day. According to the previously defined categories for origin, 17857 (69.9%) episodes arrived in the ED from the Exterior, 7204 (26.2%) from hospital institutions (1628 visits, 5.9 of total, from CHTS) and 2462 (8.9%) form Primary Care. In 9 episodes, the origin data was missing.

Centro Hospitalar do Tâmega e Sousa had a total 11257 episodes in the same period (2.8% of all CHTS ED's visits), 5737 in 2015 and 5520 in 2016, with an average of 15,4 visits per day. The difference in the average number of daily visits was statistically significant ($p<0.001$). Regarding the origin, 297 episodes (2.6%) were transferred from hospital institutions, 318 (2.8%) from primary care, and the clear majority, 10581 episodes (94,6%), arrived from the exterior.

Table 1 presents the distribution of episodes' sociodemographic variables for both EDs. Graphic 1 displays the proportion of for each variable, by ED's totals and by origin group (for UMPP).

All UMPP's origin group had higher proportion of visits by women, but this proportion was greater in visitors from hospital institutions (65.1%). Sex proportion according the group of origin are statistically significant ($p<0.001$).

Even though statistically significant different ($p=0.025$), sex distribution is very similar between EDs, also with higher proportion of women (62.1% in UMPP and 63.3% in CHTS).

The age group 40 to 64-year-old was largely the most frequent group of visitors in each origin group (48.8% in exterior, 51.2% in primary care and 51.8% in hospital), followed by patients aged between 25 and 39 years (25.5% in exterior, 25.8% in primary care and 24.4% in hospital). While 18-24 was the third most frequent group for visitor from exterior (10.5%) and hospital institutions (10.9%), for primary care, it was the 65-79 (11.1%). The least frequent group was, for all origins, the >80, accounting for less

than 4% in every group. Differences between origin group are statistically significant ($p<0.001$).

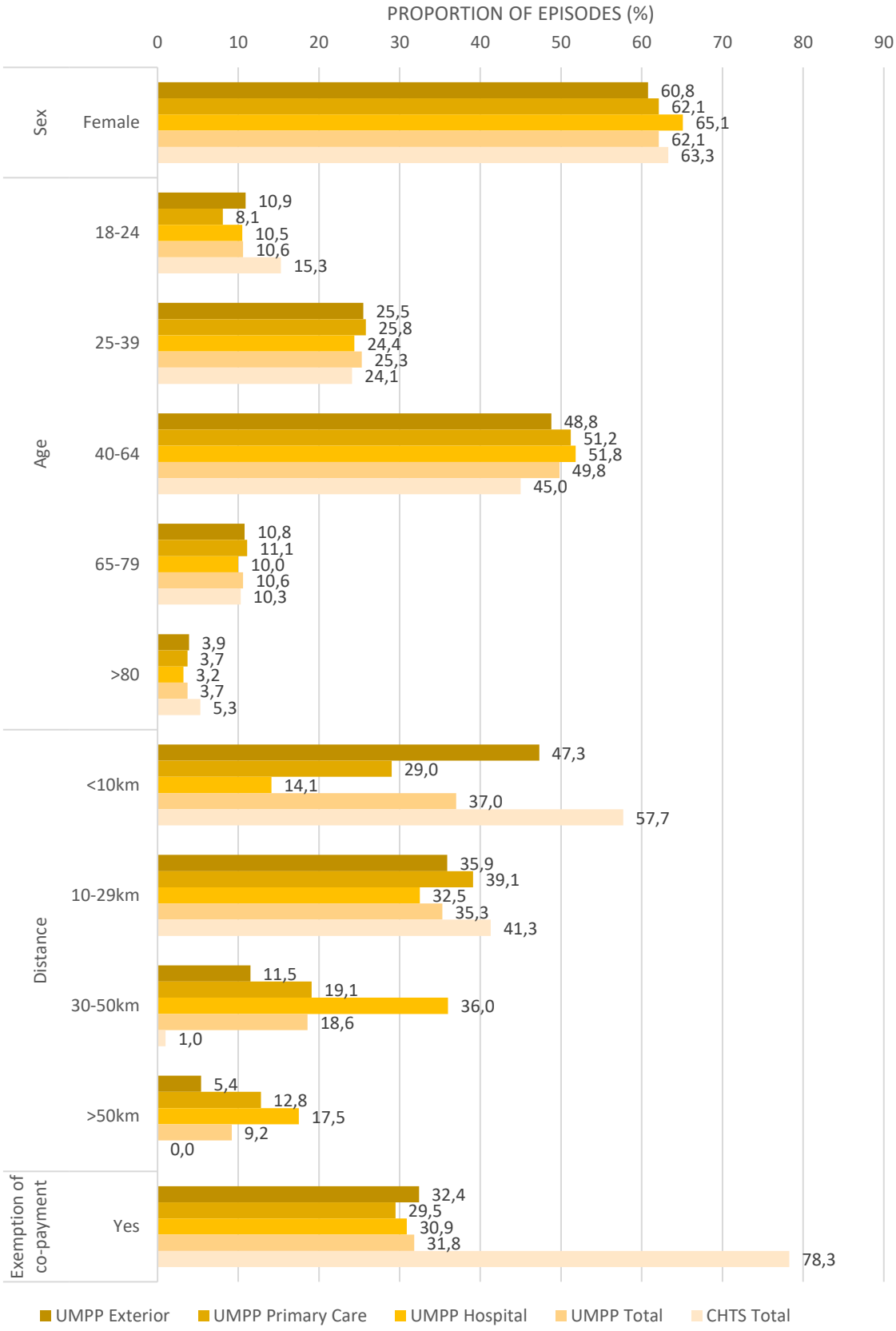
Although statistically significant different ($p<0.001$), age distribution was also similar between EDs. The most frequent group was 40-64 (49.8% for UMPP and 45.0% for CHTS), followed by 25-39 (25.3% for UMPP and 24.1% for CHTS). The major difference appears in group 18-24, where CHTS has a larger proportion (15.3%) than UMPP (10.6%). Groups 65-79 has again similar proportions in each ED (10.6% for UMPP and 10,3% for CHTS). The least frequent group was >80 (3.7% for UMPP and 5.3% for CHTS).

The distribution of visits according to distance to the ED varies substantially according to origin group. Visitors from the exterior tend to live closer to the hospital (proportion of visits diminishes consistently as the distance increases). Almost half the visits from the exterior (47.3%) are due to patients that live less than 10km away from CHSJ, whilst only 5.4% are from patients that live more than 50km away. In the case of primary care visitors, the majority (39.1%) has their residence between 10 and 29km from CHSJ, followed by less than 10km (29.0%). The proportion of visits from hospital transfer increase as the distance also increases, until 30-50km, the group with most visits (36.0%). Differences between origin group are statistically significant ($p<0.001$).

The UMPP overall number of visits follows the pattern of its most numbered group of origin, exterior visits, with proportion of patients diminishing consistently as the distance increases. The same pattern is observed in CHTS, but here almost 99% of visits came from patients that live less than 30km away (57.7% from <10km and 41.3% from 10-29km). Differences between ED are statistically significant ($p<0.001$).

The proportion of visits exempted of co-payments is similar between UMPP's origin group, accounting for about one-third of visits. The proportion is higher in exterior (32.4%), followed by hospital transfer (30.9%) by primary care (29.5%). Differences are statistically significant ($p=0.003$).

This proportion differs largely between EDs. Contrary to UMPP (31.8%), most visits in CHTS (78.3%) are exempted of co-payments. This difference is statistically significant ($p<0.001$).



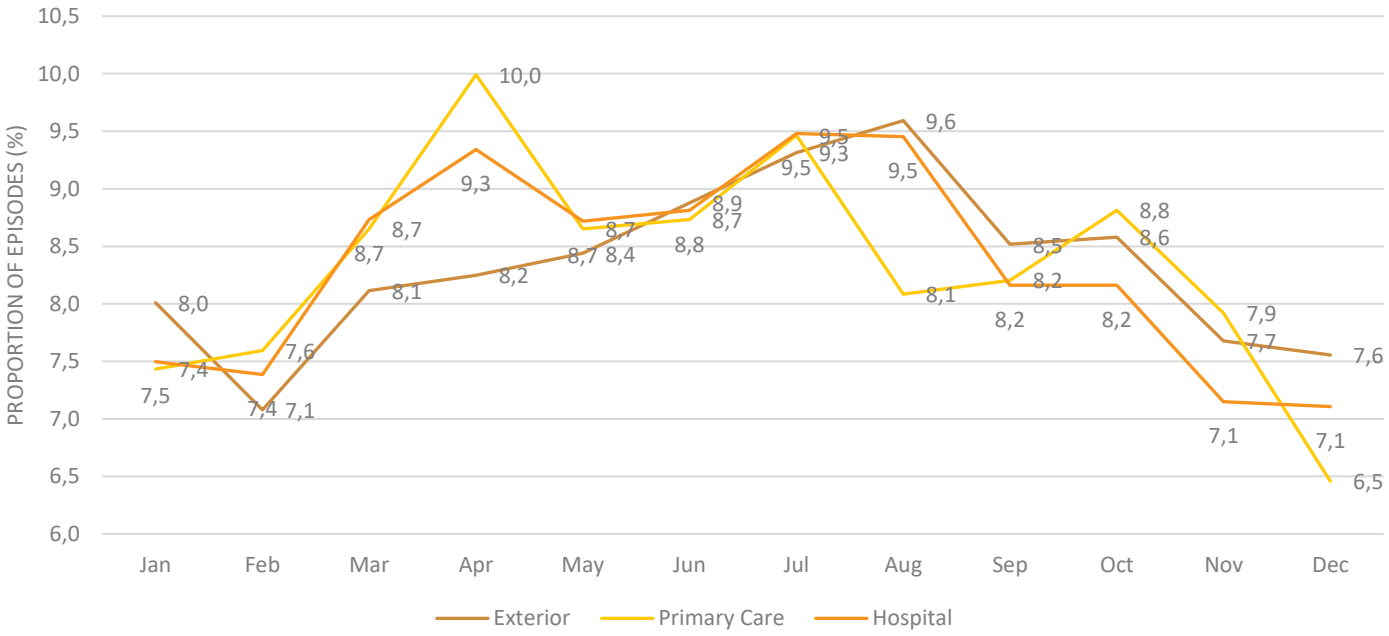

**Graphic I** – Sociodemographic characteristics of patients at both Emergency departments, in 201 and 2016, by origin group. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.

| | | UMPP | | | | | | | | | CHTS | | UMPP vs CHTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Exterior | | Primary Care | | Hospital | | Total | | | Total | | |
| | | n | % | n | % | n | % | n | % | p | n | % | p |
| **Sex** | **Female** | 10862 | 60.8 | 1530 | 62.1 | 4688 | 65.1 | 17080 | 62.1 | | 7085 | 63.3 | |
| | **Male** | 6995 | 39.2 | 932 | 37.9 | 2516 | 34.9 | 10443 | 37.9 | <0.001 | 4111 | 36.7 | |
| | **Total** | 17857 | | 2462 | | 7204 | | 27523 | | | 11196 | | 0.025 |
| **Age** | **18-24** | 1950 | 10.9 | 200 | 8.1 | 760 | 10.5 | 2910 | 10.6 | | 1717 | 15.3 | |
| | **25-39** | 4562 | 25.5 | 635 | 25.8 | 1759 | 24.4 | 6956 | 25.3 | | 2693 | 24.1 | |
| | **40-64** | 8718 | 48.8 | 1261 | 51.2 | 3734 | 51.8 | 13713 | 49.8 | <0.001 | 5043 | 45,0 | |
| | **65-79** | 1931 | 10.8 | 274 | 11.1 | 722 | 10,0 | 2927 | 10.6 | | 1149 | 10.3 | |
| | **>80** | 696 | 3.9 | 92 | 3.7 | 229 | 3.2 | 1017 | 3.7 | | 594 | 5.3 | |
| | **Total** | 17857 | | 2462 | | 7204 | | 27523 | | | 11196 | | <0.001 |
| **Distance** | **<10km** | 8388 | 47.3 | 711 | 29,0 | 1004 | 14.1 | 10103 | 37,0 | | 6401 | 57.7 | |
| | **10-29km** | 6363 | 35.9 | 958 | 39.1 | 2317 | 32.5 | 9638 | 35.3 | | 4578 | 41.3 | |
| | **30-50km** | 2031 | 11.5 | 469 | 19.1 | 2570 | 36,0 | 5070 | 18.6 | <0.001 | 109 | 1,0 | |
| | **>50km** | 955 | 5.4 | 313 | 12.8 | 1246 | 17.5 | 2514 | 9.2 | | 2 | 0,0 | |
| | **Total** | 17737 | | 2451 | | 7137 | | 27325 | | | 11090 | | <0.001 |
| **Exemption of co-payment** | **No** | 12068 | 67.6 | 1736 | 70.5 | 4979 | 69.1 | 18783 | 68.2 | | 2446 | 21.7 | |
| | **Yes** | 5789 | 32.4 | 726 | 29.5 | 2225 | 30.9 | 8740 | 31.8 | 0.003 | 8811 | 78.3 | <0.001 |
| | **Total** | 17857 | | 2462 | | 7204 | | 27523 | | | 11257 | | |

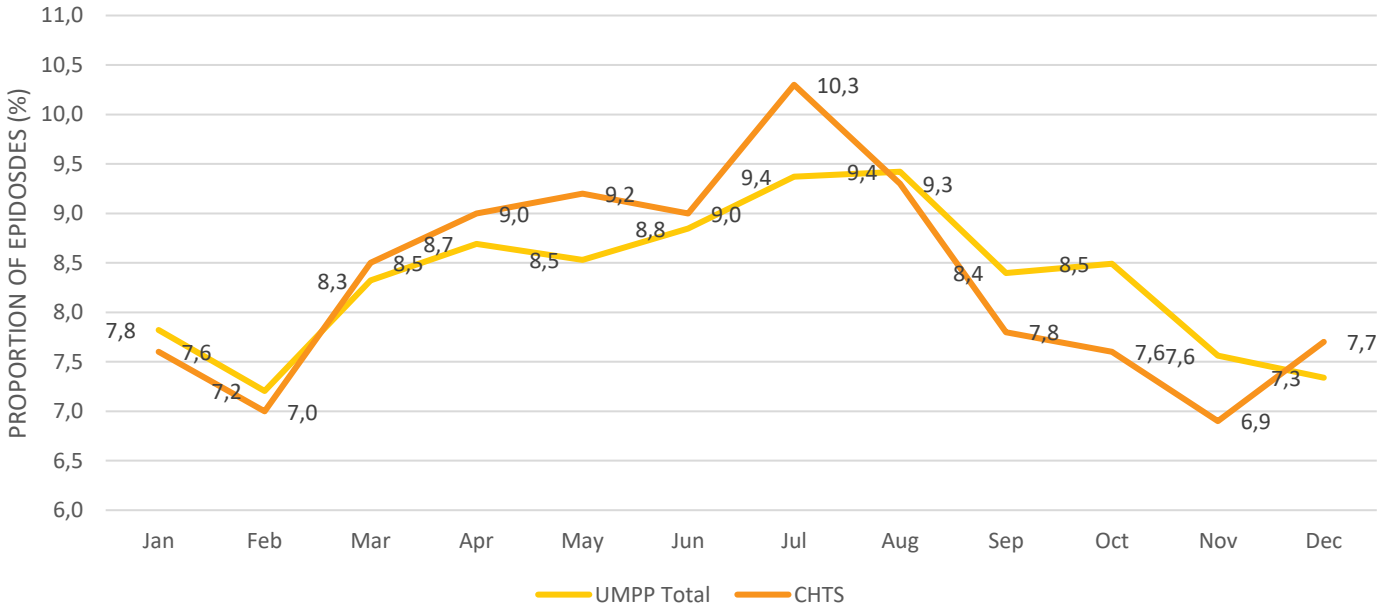
**Table 1** - Episode distribution in each ED, by origin (for UMPP) and according to sociodemographic variables. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.

## DISTRIBUTION BY MONTH

Table II presents ED's visit distribution according to month of the year (by origin for UMPP and totals for UMPP and CHTS). Graph II and Graph III display this variation, respectively, for UMPP's categories of origin and for both ED's totals.




**Graphic II** - UMPP proportion of visits in 2015 and 2016 by month of the year, according to the origin group. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.




**Graphic III** - Emergency Departments' proportion of visits in 2015 and 2016 by month of the year. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.

Globally, all UMPP origin groups' episodes were less frequent from November to February, with a major reduction in December for primary care group (6.5%) and February for exterior group (7.1%). Primary care and hospital groups achieve two peaks, in April (respectively 9.3% and 10.0%) and July (9.5% both). The group transferred from other hospitals peaks in August (9.5%), contrary to primary care, which gets an important fall in the same month (8.1%), increasing again in October (8.8%). A different distribution is seen for patients from the exterior, whose visits in April almost do not increase (8.1%), only achieving a major peak in August (9.6%).

Centro Hospitalar do Tâmega e Sousa presented a distribution by month similar to overall UMPP, also with lesser visits from October/November to February, getting also a major breakdown in February (7.0% for CHTS and 7.2% for UMPP) and November (6.9% for CHTS and 7.6% for UMPP). Both ED's have their peaks in July (10.3% for CHTS and 9.4% for UMPP).

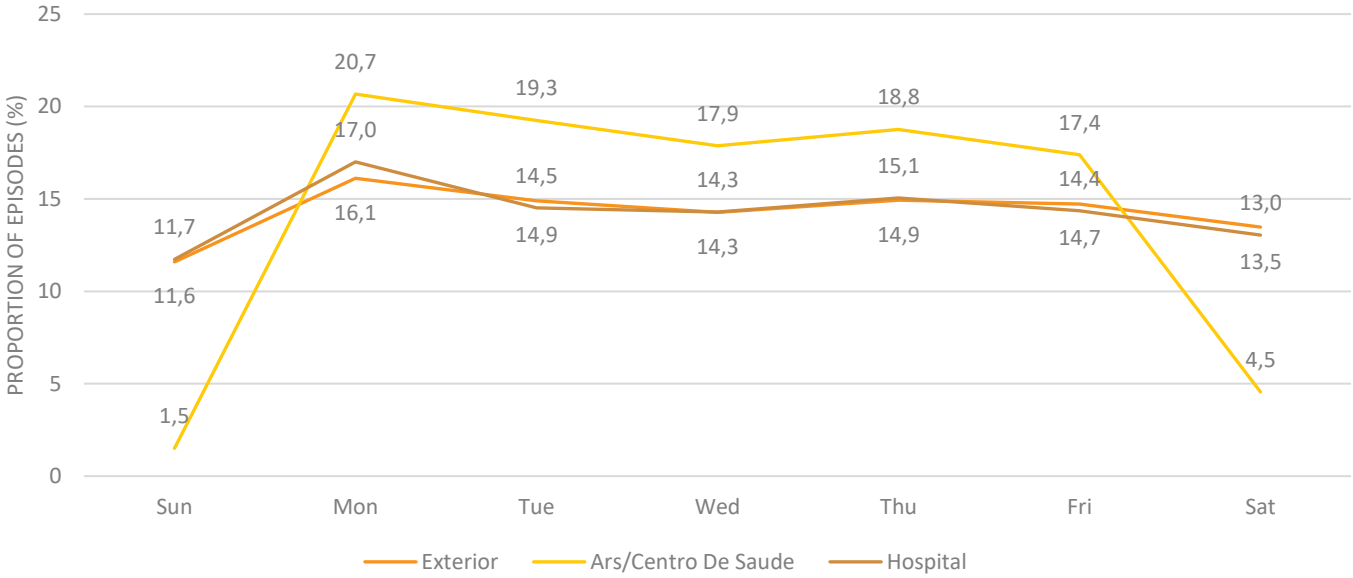
Chi-square tests comparing the distribution of visits per month between UMPP origin groups and between CHTS and UMPP totals show that the differences are statistically significant (respectively $p=0.048$ and $p=0.002$).

| | UMPP | | | | | | | | | CHTS | | UMPP vs CHTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exterior | | Primary Care | | Hospital | | Total | | p | Total | | p |
| Month | n | % | n | % | n | % | n | % | | n | % | |
| Jan | 1430 | 8.0 | 183 | 7.4 | 540 | 7.5 | 2153 | 7.8 | 0.048 | 859 | 7.6 | 0.002 |
| Feb | 1264 | 7.1 | 187 | 7.6 | 532 | 7.4 | 1983 | 7.2 | | 783 | 7 | |
| Mar | 1449 | 8.1 | 213 | 8.7 | 629 | 8.7 | 2291 | 8.3 | | 960 | 8.5 | |
| Apr | 1473 | 8.2 | 246 | 10.0 | 673 | 9.3 | 2392 | 8.7 | | 1012 | 9 | |
| May | 1507 | 8.4 | 213 | 8.7 | 628 | 8.7 | 2348 | 8.5 | | 1031 | 9.2 | |
| Jun | 1585 | 8.9 | 215 | 8.7 | 635 | 8.8 | 2435 | 8.8 | | 1009 | 9 | |
| Jul | 1663 | 9.3 | 233 | 9.5 | 683 | 9.5 | 2579 | 9.4 | | 1165 | 10.3 | |
| Aug | 1713 | 9.6 | 199 | 8.1 | 681 | 9.5 | 2593 | 9.4 | | 1044 | 9.3 | |
| Sep | 1521 | 8.5 | 202 | 8.2 | 588 | 8.2 | 2311 | 8.4 | | 881 | 7.8 | |
| Oct | 1532 | 8.6 | 217 | 8.8 | 588 | 8.2 | 2337 | 8.5 | | 860 | 7.6 | |
| Nov | 1371 | 7.7 | 195 | 7.9 | 515 | 7.1 | 2081 | 7.6 | | 781 | 6.9 | |
| Dec | 1349 | 7.6 | 159 | 6.5 | 512 | 7.1 | 2020 | 7.3 | | 872 | 7.7 | |
| Total | 17857 | | 2462 | | 7204 | | 27523 | | | 11257 | | |

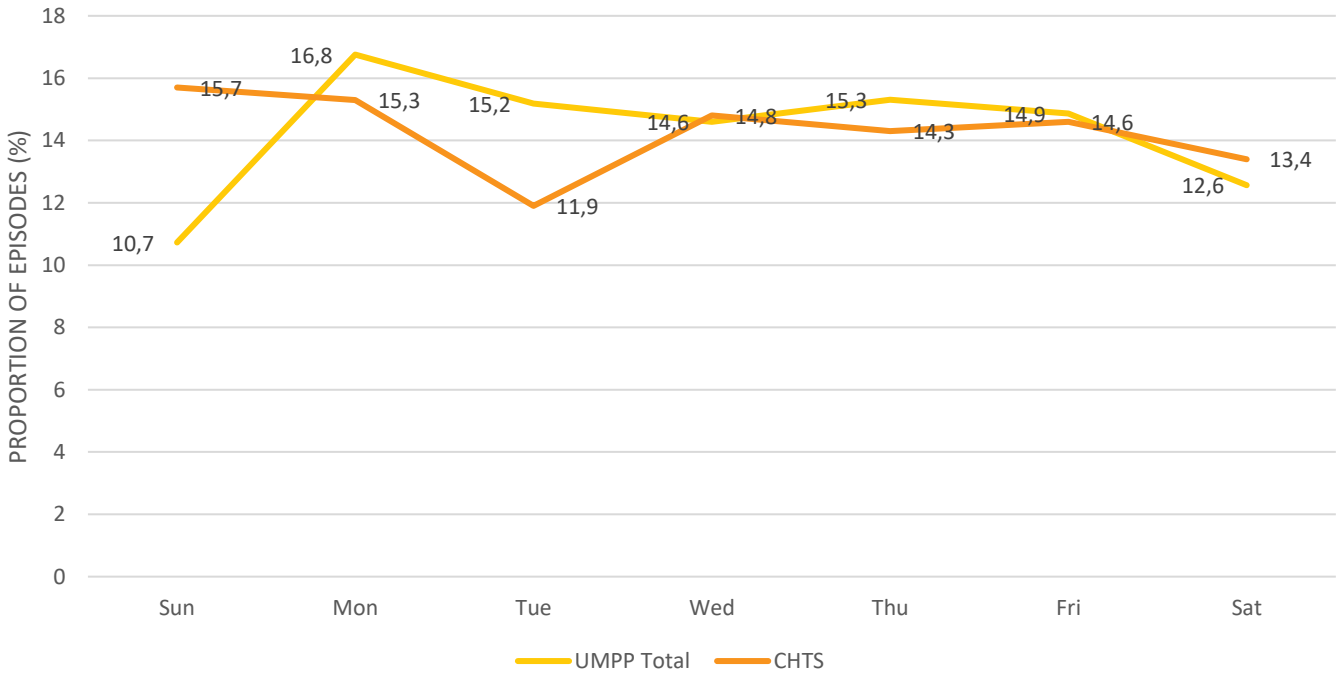
**Table II** - Episode distribution in each ED, by origin (for UMPP) and according to month. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.

DISTRIBUTION BY WEEKDAY

Table III presents ED's visit distribution according to weekday (by origin for UMPP and totals for UMPP and CHTS). Graph IV and Graph V display this variation, respectively, for UMPP's categories of origin and for both ED's totals.




**Graphic IV** - UMPP proportion of visits in 2015 and 2016 by weekday, according to the origin group. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.




**Graphic V** – Emergency Departments' proportion of visits in 2015 and 2016 by weekday. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.

All origin groups present higher number of visits on Mondays (16.1% for exterior, 20.7% for primary care and 17.0% for hospital), falling softly until Wednesday (14.3% for exterior, 17.9% for primary care and 14.3% for hospital), recovering Thursday (14.9% for exterior, 18.8% for primary care and 15.1% for hospital), and falling softly again Friday (17.4% for exterior, 14.7% for primary care and 14.4% for hospital). At weekends, all groups reduce substantially (13.5% for exterior and 13.0% for hospital at Saturday, and 11.6% for exterior and 11.7% for hospital at Sunday), but this reduction is far more evident for primary care (4.5% at Saturday and 1.5% at Sunday).

The difference between groups is statistically significant, as calculated by a Chi-square test ($p<0,001$).

Total visits in UMPP follow the tendency described for individual origin groups, but the tendency for CHTS follows a different pattern. Sunday is the day with more visits (15.7% for CHTS, while 10.7% for UMPP), followed by Monday (15.3% for CHTS and 16.8% for UMPP). Tuesday is the day with less visits for CHTS (11.9% for CHTS, while 15.2% for UMPP), recovering Wednesday (14.8% for CHTS and 14.6% for UMPP), maintaining a relatively stable course until Saturday, when it gets another breakdown (13.4% for CHTS, and 12.6% for UMPP).

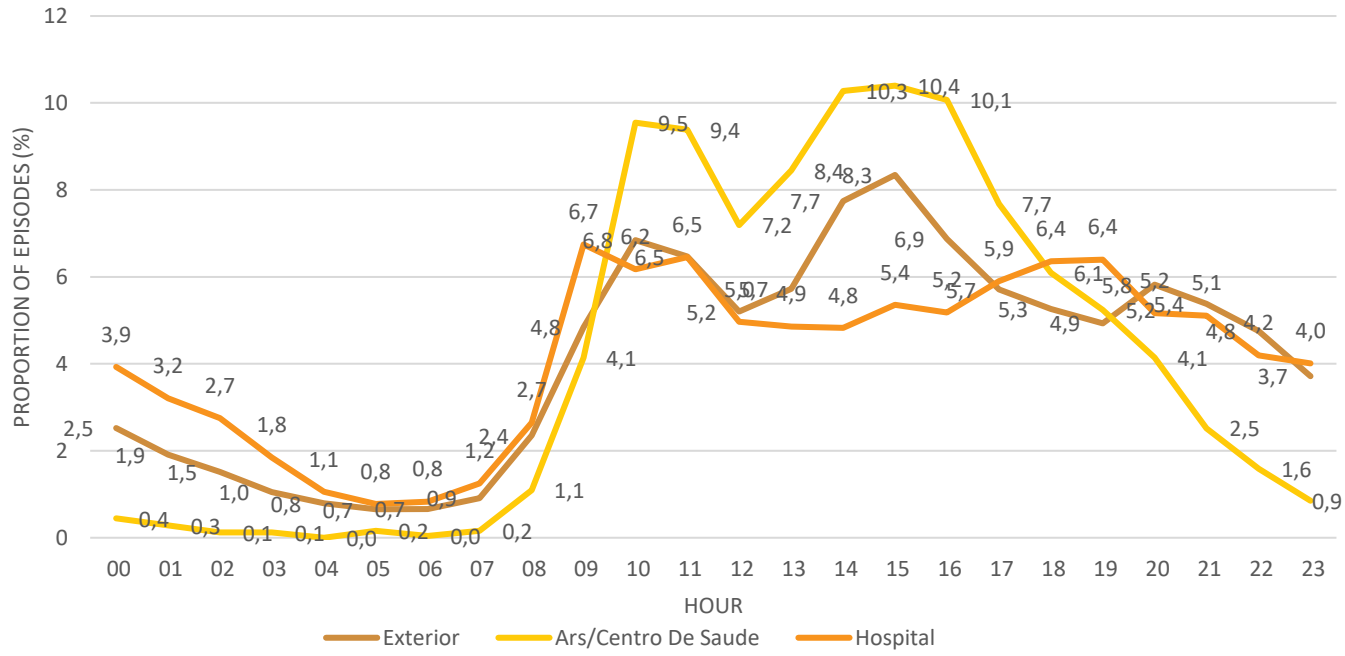
A Chi-square test comparing these two EDs concludes the differences are statistically significant ($p<0,001$).

| | UMPP | | | | | | | | | CHTS | | UMPP vs CHTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exterior | | Primary Care | | Hospital | | Total | | | Total | | |
| Month | n | % | n | % | n | % | n | % | p | n | % | p |
| **Sun** | 2952 | 11.6 | 37 | 1.5 | 845 | 11.7 | 2952 | 10.7 | <0.001 | 1766 | 15.7 | <0.001 |
| **Mon** | 4612 | 16.1 | 509 | 20.7 | 1225 | 17.0 | 4612 | 16.8 | | 1718 | 15.3 | |
| **Tue** | 4180 | 14.9 | 474 | 19.3 | 1046 | 14.5 | 4180 | 15.2 | | 1343 | 11.9 | |
| **Wed** | 4017 | 14.3 | 440 | 17.9 | 1029 | 14.3 | 4017 | 14.6 | | 1665 | 14.8 | |
| **Thu** | 4212 | 14.9 | 462 | 18.8 | 1085 | 15.1 | 4212 | 15.3 | | 1613 | 14.3 | |
| **Fri** | 4092 | 14.7 | 428 | 17.4 | 1034 | 14.4 | 4092 | 14.9 | | 1641 | 14.6 | |
| **Sat** | 3458 | 13.5 | 112 | 4.5 | 940 | 13.0 | 3458 | 12.6 | | 1511 | 13.4 | |
| **Total** | 27523 | | 2462 | | 7204 | | 27523 | | | 11257 | | |

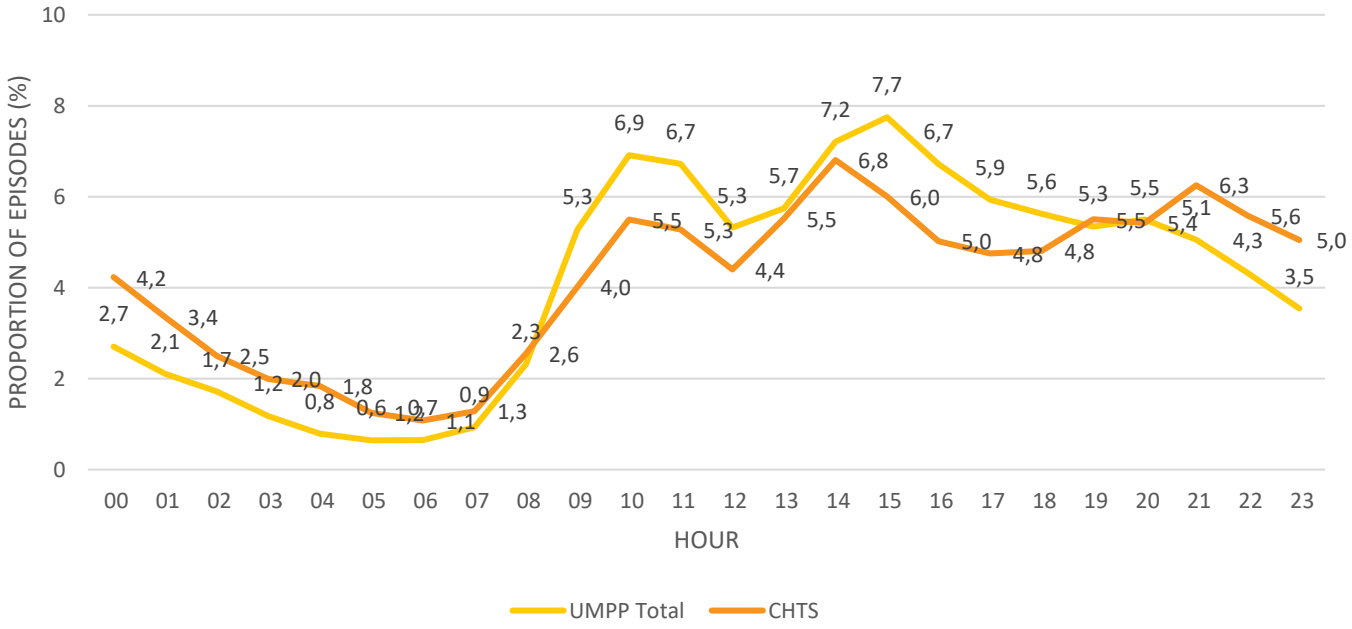
**Table III** - Episode distribution in each ED, by origin (for UMPP) and according to weekday. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.

### DISTRIBUTION BY HOUR OF THE DAY

Table IV presents ED's visit distribution according to hour of the day (by origin for UMPP and totals for UMPP and CHTS). Graph VI and Graph VII display this variation, respectively, for UMPP's categories of origin and for both ED's totals.




**Graph VI** – UMPP proportion of visits in 2015 and 2016 by hour of the day, according to origin group.




**Graphic VII** – Emergency Departments' proportion of visits in 2015 and 2016 by hour of the day. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.

All origin groups follow similar courses in terms of distribution of visits by hour. A high increase from lower rates at 7h to a first peak at 9h-10h At 12h there is a first fall, followed by another increase and peak from 14h to 16h. Hospital transfer doesn't follow this peak, and has a relatively stable rate of visit until 18h-19h, when there is a small peak (6.4%); since then, it has a globally continuous fall to a minimum at 6h-7h (0.8%), when it starts rising again. Primary care has a the most expressive variation of rates: it gets to a maximum peak of 10.4% at 15h, then falling to a stable minimum of 0.4% at 00h to 0.2% at 7h, then starting to rise. Since the peak at 15h (8.3%), exterior visits have another smaller peak at 20h (52%), then falling consistently until 6h.

The difference between groups was statistically significant, as calculated by a Chi-square test ($p<0,001$).

Totals from UMPP and CHTS follow a similar path between them and, globally, comparing to the origin groups from UMPP, but UMPP shows a wider variation, from 0.6% at 5h to 7.7% at 15h, while CHTS ranges from 1.1% at 6h to 6,8 at 14h. CHTS also has minor peak at 21h (6.3%) that doesn´t occur in UMPP.

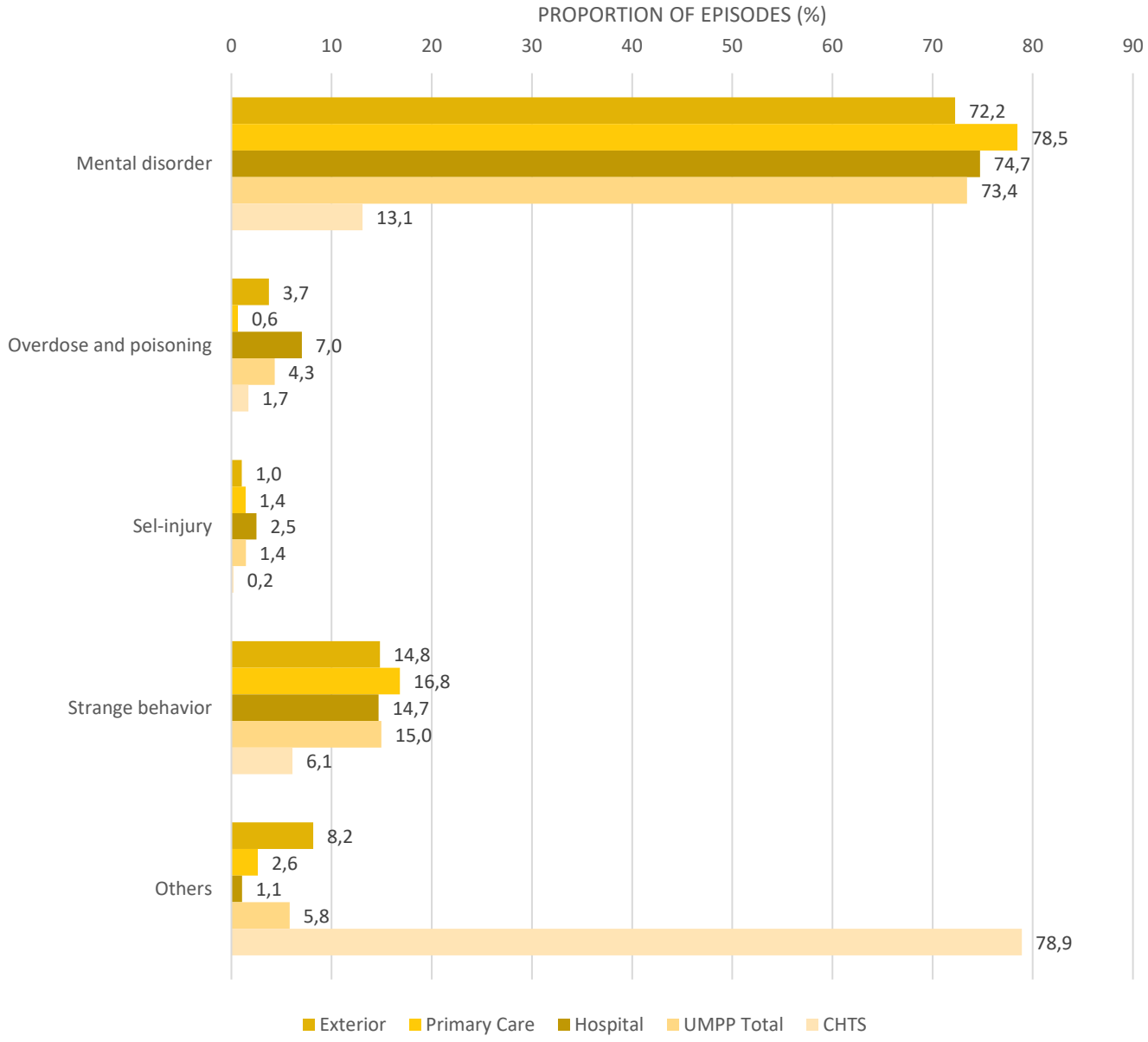
The differences between this two ED are statistically significant, as calculated by a chi-squared test ($p<0.001$).

| | UMPP | | | | | | | | | CHTS | | UMPP vs CHTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exterior | | Primary Care | | Hospital | | Total | | | Total | | |
| Hour | n | % | n | % | n | % | n | % | p | n | % | p |
| **00** | 451 | 2.5 | 11 | 0.4 | 283 | 3.9 | 745 | 2.7 | <0.001 | 474 | 4.2 | <0.001 |
| **01** | 342 | 1.9 | 7 | 0.3 | 231 | 3.2 | 580 | 2.1 | | 376 | 3.4 | |
| **02** | 271 | 1.5 | 3 | 0.1 | 198 | 2.7 | 472 | 1.7 | | 280 | 2.5 | |
| **03** | 187 | 1.0 | 3 | 0.1 | 133 | 1.8 | 323 | 1.2 | | 223 | 2.0 | |
| **04** | 141 | 0.8 | 0 | 0.0 | 76 | 1.1 | 217 | 0.8 | | 206 | 1.8 | |
| **05** | 117 | 0.7 | 4 | 0.2 | 56 | 0.8 | 177 | 0.6 | | 140 | 1.2 | |
| **06** | 118 | 0.7 | 1 | 0.0 | 60 | 0.8 | 179 | 0.7 | | 121 | 1.1 | |
| **07** | 162 | 0.9 | 4 | 0.2 | 90 | 1.2 | 256 | 0.9 | | 144 | 1.3 | |
| **08** | 420 | 2.4 | 27 | 1.1 | 191 | 2.7 | 638 | 2.3 | | 286 | 2.6 | |
| **09** | 865 | 4.8 | 102 | 4.1 | 486 | 6.7 | 1453 | 5.3 | | 451 | 4.0 | |
| **10** | 1222 | 6.8 | 235 | 9.5 | 445 | 6.2 | 1902 | 6.9 | | 616 | 5.5 | |
| **11** | 1155 | 6.5 | 231 | 9.4 | 465 | 6.5 | 1851 | 6.7 | | 592 | 5.3 | |
| **12** | 929 | 5.2 | 177 | 7.2 | 358 | 5.0 | 1464 | 5.3 | | 493 | 4.4 | |
| **13** | 1023 | 5.7 | 208 | 8.4 | 350 | 4.9 | 1581 | 5.7 | | 619 | 5.5 | |
| **14** | 1383 | 7.7 | 253 | 10.3 | 348 | 4.8 | 1984 | 7.2 | | 763 | 6.8 | |
| **15** | 1490 | 8.3 | 256 | 10.4 | 386 | 5.4 | 2132 | 7.7 | | 673 | 6.0 | |
| **16** | 1227 | 6.9 | 248 | 10.1 | 373 | 5.2 | 1848 | 6.7 | | 563 | 5.0 | |
| **17** | 1020 | 5.7 | 189 | 7.7 | 425 | 5.9 | 1634 | 5.9 | | 533 | 4.8 | |
| **18** | 940 | 5.3 | 150 | 6.1 | 458 | 6.4 | 1548 | 5.6 | | 539 | 4.8 | |
| **19** | 881 | 4.9 | 129 | 5.2 | 461 | 6.4 | 1471 | 5.3 | | 617 | 5.5 | |
| **20** | 1039 | 5.8 | 102 | 4.1 | 372 | 5.2 | 1513 | 5.5 | | 608 | 5.4 | |
| **21** | 961 | 5.4 | 62 | 2.5 | 368 | 5.1 | 1391 | 5.1 | | 701 | 6.3 | |
| **22** | 849 | 4.8 | 39 | 1.6 | 302 | 4.2 | 1190 | 4.3 | | 626 | 5.6 | |
| **23** | 664 | 3.7 | 21 | 0.9 | 289 | 4.0 | 974 | 3.5 | | 566 | 5.0 | |
| **Total** | 17857 | | 2462 | | 7204 | | 27523 | | | 11210 | | |

**Table IV** - Episode distribution in each ED, by origin (for UMPP) and according to hour of the day. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.

### DISTRIBUTION BY MTS FLOWCHART

Table V presents both ED's visit distribution by origin, according to MTS flowchart. Graph VIII displays the proportion of each MTS flowchart by origin (for UMPP) and both ED's totals.




**Graph VIII** – UMPP's and overall Emergency Departments' proportion of visits in 2015 and 2016 by Manchester Triage System Flowchart. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.

*Mental disorder* was the MTS flowchart most frequent for all origin groups (72.2% for exterior, 78.5% for primary care and 74.7% for hospital), followed by *Strange behavior* (14.8% for exterior, 16.8% for primary care and 16.7% for hospital). *Others* was the third

most frequent flowchart for exterior (8.2%) and primary care (2.6%), but the least frequent for hospital (1.1%), whose third most frequent flowchart was *Overdose and poisoning* (7.0%). The latter flowchart was the least frequent to primary care (0.6%). *Self-injury* (1.0%) was the least common flowchart for exterior visits.

Difference between these groups was statistically significant, as calculated by a Chi-square test ($p<0.001$).

The distribution for CHTS was very different. *Others* was by far the most frequent flowchart (78.9%), whereas in overall UMPP it accounts for only 5.8%. *Mental disorder* was the second most frequent flowchart for CHTS (13.1%) and the most frequent in UMPP (5.8%). For CHTS, then follows strange behavior (6.1%), overdose and poisoning (1.7%) and self-injury (0.2%), while in UMPP, they account, respectively, for 15.0%, 4.3% and 1.4%.

The difference between these EDs was statistically significant, according to a Chi-square test ($p<0.001$).

### DISTRIBUTION BY MTS DISCRIMINATOR

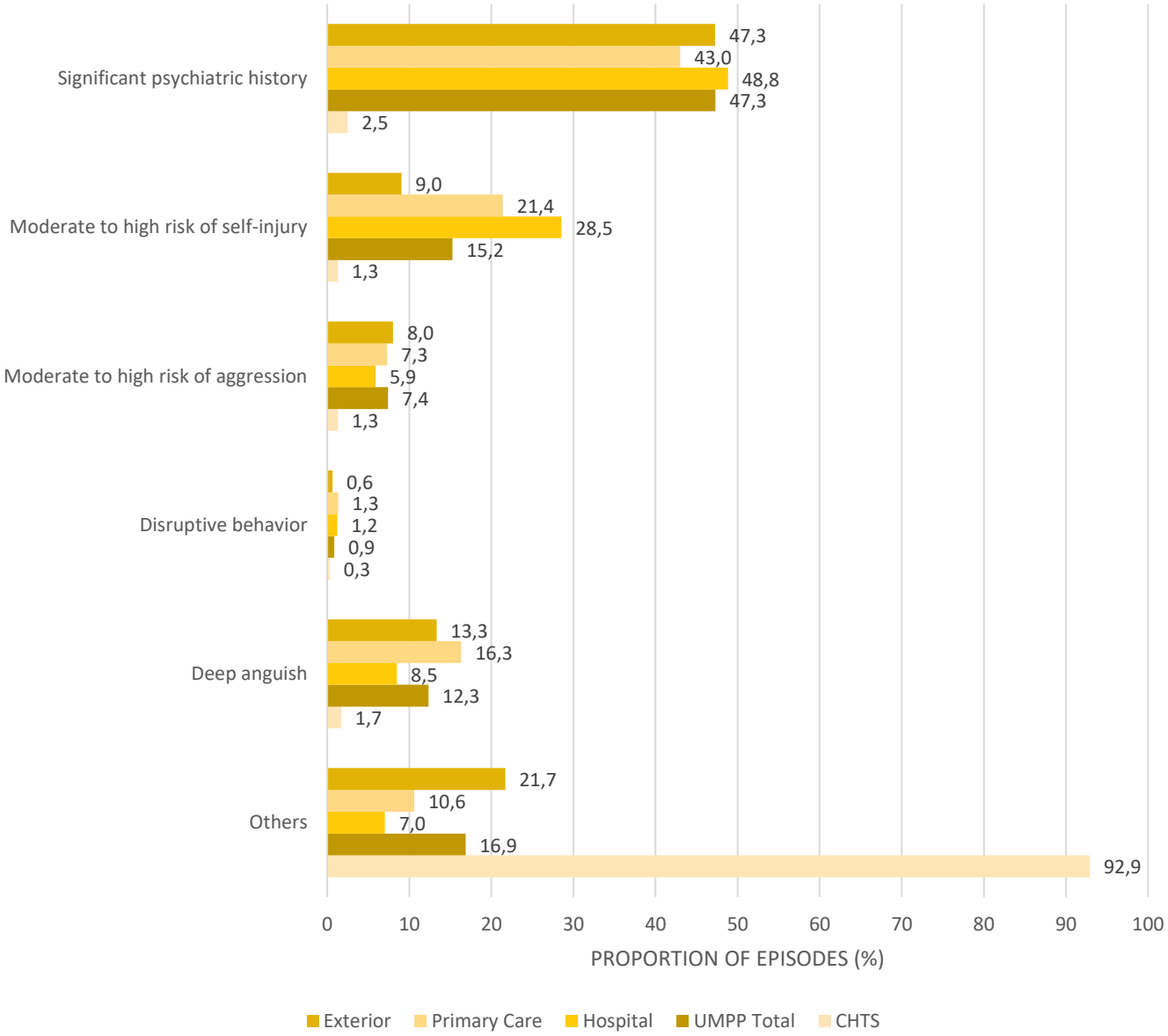
Table VI presents both ED's visit distribution by origin, according to MTS discriminator. Graph IX displays the proportion of each MTS discriminator by origin (for UMPP) and both ED's totals.

*Significant psychiatry history* was the most frequent MTS discriminator in all UMPP origin groups (47.3% for exterior, 43.0% for primary care and 48.8% for hospital). For exterior visits, it follows *Others* (21.7%), *Deep anguish* (13.3%), *Moderate to high-risk of self-injury* (9.0%), *Moderate to high risk of aggression* (8.0%) and, at last, *Disruptive behavior* (0.6%), which was also the least frequent discriminator for primary care (1.3%) and hospital transfers (1.2%). For primary care, the second most frequent discriminator was *Moderate to high-risk of self-injury* (21.4%), followed by *Deep anguish* (16.3%), *Others* (10.6%) and *Moderate to high-risk of aggression* (7.3%). For hospital transfer, the second most frequent discriminator was *Moderate to high-risk of self-injury* (28.5%), followed by *Deep anguish* (8.5%), *Others* (7.0%) and *Moderate to high-risk of aggression* (5.9%).

The differences between origin groups were statistically significant, as performed by a Chi-square test ($p<0.001$).

Distribution for CHTS is very different. The group of discriminators *Others* represent 92.9% of visits (16.9% in UMPP totals), followed by *Significant psychiatric history* (2.5%), the most frequent discriminator in UMPP totals (47.3%). The other discriminators have similar distributions for CHTS, with *Disruptive behavior* being also the least frequent for the two EDs.

The differences between these EDs were statistically significant, as calculated by a Chi-square test ($p<0.001$).




**Graph IX** - UMPP's and overall Emergency Departments' proportion of visits in 2015 and 2016 by Manchester Triage System discriminator. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.

| | UMPP | | | | | | | | | CHTS | | UMPP vs CHTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exterior | | Primary Care | | Hospital | | Total | | | Total | | |
| **MTS Flowchart** | n | % | n | % | n | % | n | % | p | n | % | p |
| **Sel-injury** | 184 | 1.0 | 35 | 1.4 | 180 | 2.5 | 399 | 1.4 | <0.001 | 20 | 0.2 | <0.001 |
| **Strange behavior** | 2647 | 14.8 | 414 | 16.8 | 1059 | 14.7 | 4120 | 15.0 | | 688 | 6.1 | |
| **Mental disorder** | 12900 | 72.2 | 1932 | 78.5 | 5383 | 74.7 | 20215 | 73.4 | | 1478 | 13.1 | |
| **Overdose and poisoning** | 669 | 3.7 | 16 | 0.6 | 506 | 7.0 | 1191 | 4.3 | | 187 | 1.7 | |
| **Others** | 1457 | 8.2 | 65 | 2.6 | 76 | 1.1 | 1598 | 5.8 | | 8884 | 78.9 | |
| **Total** | 17857 | | 2462 | | 7204 | | 27523 | | | 11257 | | |

**Table V** - Episode distribution in each ED, by origin (for UMPP) and according to MTS flowchart. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.

| | UMPP | | | | | | | | | CHTS | | UMPP vs CHTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exterior | | Primary Care | | Hospital | | Total | | | Total | | |
| **MTS Discriminator** | n | % | n | % | n | % | n | % | p | n | % | p |
| **Moderate to high risk of aggression** | 1434 | 8.0 | 180 | 7.3 | 425 | 5.9 | 2039 | 7.4 | <0.001 | 151 | 1.3 | <0.001 |
| **Moderate to high risk of self-injury** | 1614 | 9.0 | 527 | 21.4 | 2056 | 28.5 | 4197 | 15.2 | | 144 | 1.3 | |
| **Deep anguish** | 2381 | 13.3 | 402 | 16.3 | 611 | 8.5 | 3394 | 12.3 | | 188 | 1.7 | |
| **Disruptive behavior** | 115 | 0.6 | 33 | 1.3 | 88 | 1.2 | 236 | 0.9 | | 38 | 0.3 | |
| **Significant psychiatric history** | 8440 | 47.3 | 1059 | 43.0 | 3517 | 48.8 | 13016 | 47.3 | | 282 | 2.5 | |
| **Others** | 3873 | 21.7 | 261 | 10.6 | 3873 | 7.0 | 4641 | 16.9 | | 10454 | 92.9 | |
| **Total** | 17857 | | 2462 | | 7204 | | 27523 | 0 | | 11257 | | |

**Table VI** - Episode distribution in each ED, by origin (for UMPP) and according to MTS discriminator. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.

## DISTRIBUTION BY DISCHARGE DIAGNOSIS

Table VI presents both ED's visit distribution by origin (for UMPP) and both ED's totals, according to CID-9 diagnosis at discharge. Graph IX displays the proportion of each diagnosis by origin (for UMPP) and both ED's totals.

The distribution of UMPP origin groups and totals, and CHTS differs considerably. For UMPP origin groups, *Neurotic disorders* (ICD-9: 300) was globally the most frequent discharge diagnosis, accounting for 21.6% of total episodes at UMPP. It was also the most frequent diagnosis in visits from the exterior (25.9%), but not for primary care and for hospital, respectively with a proportion of 18.0% and12.0%. About 85% of the specific diagnosis for *Neurotic disorders* refer to *Anxiety states* (ICD-9: 300.0 and subdivisions).

For hospital group, the most frequent diagnosis was *Others* (all the diagnosis not directly related to mental health), with 19.6% of this group's visits; for exterior, *Others* represented 13.8% of visits and 8.6% for primary care; globally, this was the third most frequent diagnosis. The most frequent specific diagnosis within *Others* are *Poisoning by other and unspecified drugs and medicinal substances* (ICD-9: 977.9), accounting for 29% of this group's visits and *Insomnia* (ICD-9: 780.52), with almost 15%.

The most frequent diagnosis for primary care (26.1%) was *Depressive disorders* (ICD-9: 311), being the second most frequent globally (15.2%) and the second most frequent for hospital transfer visits (16.2%).

Other frequent diagnoses were, for all UMPP visits, decreasingly, *Adjustment reaction* (ICD-9: 309), 8.5% of total visits; *Other non-organic psychoses* (ICD-9: 298), 6.0%; *Disturbance of conduct not elsewhere classified* (ICD-9: 312) 5.0%; *Suicidal ideation* (ICD-9: V62), 4.6%, *Episodic mood disorders* (ICD-9: 296) 4.5%; Schizophrenic disorders (ICD-9: 295), 3.7%; and *Dementias* (ICD-9: 290), 3.2%.

The differences in the distribution of diagnosis between groups were found statistically significant ($p<0.001$), as calculated by a Chi-square test.

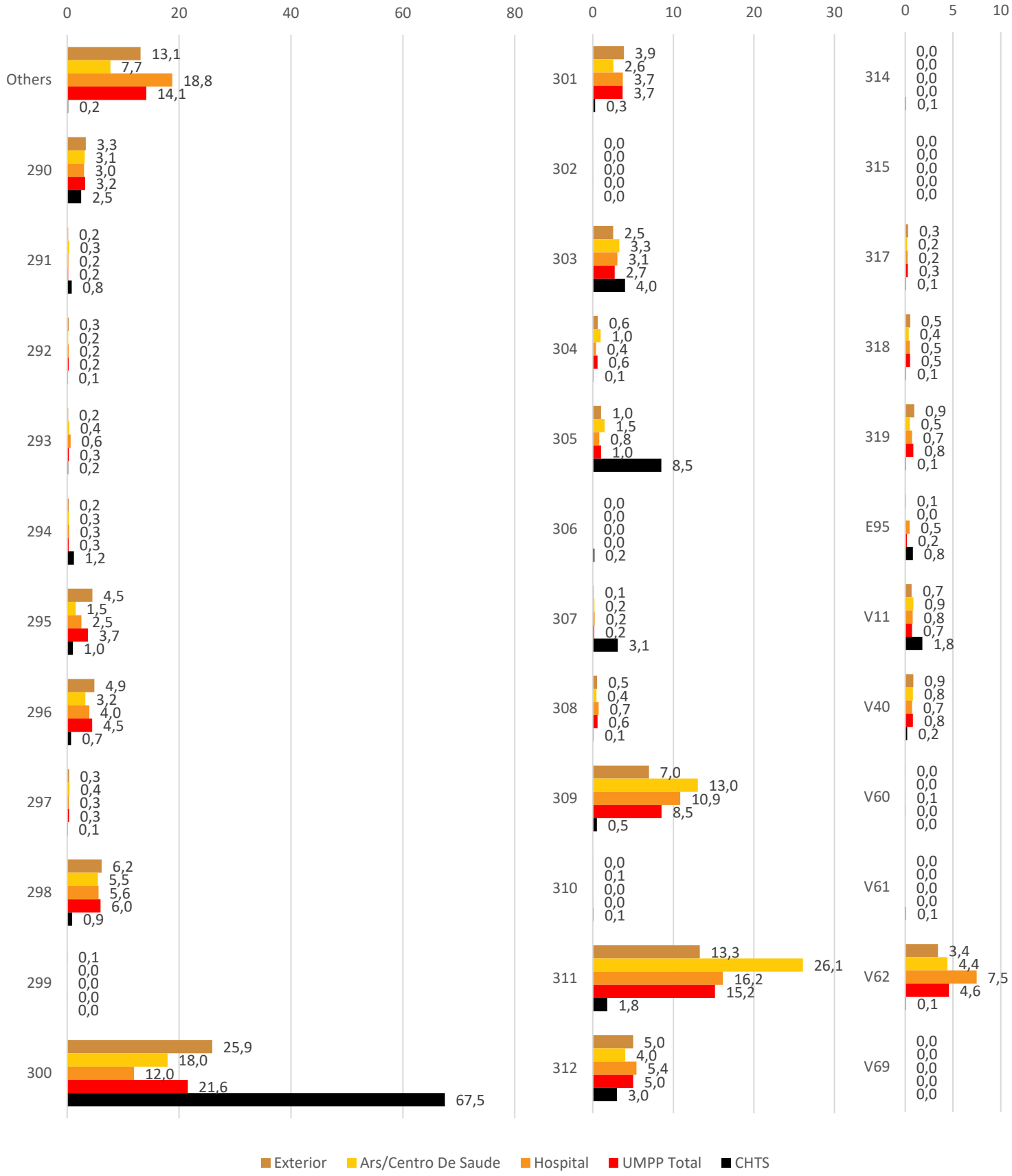
For CHTS, the most frequent diagnosis was, by far, *Neurotic disorders* (ICD-9: 300), with 67.5% of all visits in this ED, whereas for overall UMPP, it represented 216% of visits; 88% of these visits at CHTS had a specific sub-diagnosis of *Anxiety states* (ICD-9: 300.0 and subdivisions). *Non-dependent drug abuse* (ICD-9: 305) was the second most

frequent diagnosis for CHTS (8.5%, and 1.0% for UMPP), followed by *Alcohol dependence syndrome* (ICD-9: 303), 4.0% of visits (2.7% for UMPP); *Special symptoms or syndromes, not elsewhere classified* (ICD-9: 307), 3.1% (0.2% for UMPP); *Disturbance of conduct, not elsewhere classifie*d (ICD-9: 312), 3.0% (5.0% for UMPP); and Dementias (ICD-9: 290), 2.5% (3.2% for UMPP). *Others*, a relevant group for UMPP (14.1%), only represents 0.2% of visits in CHTS.

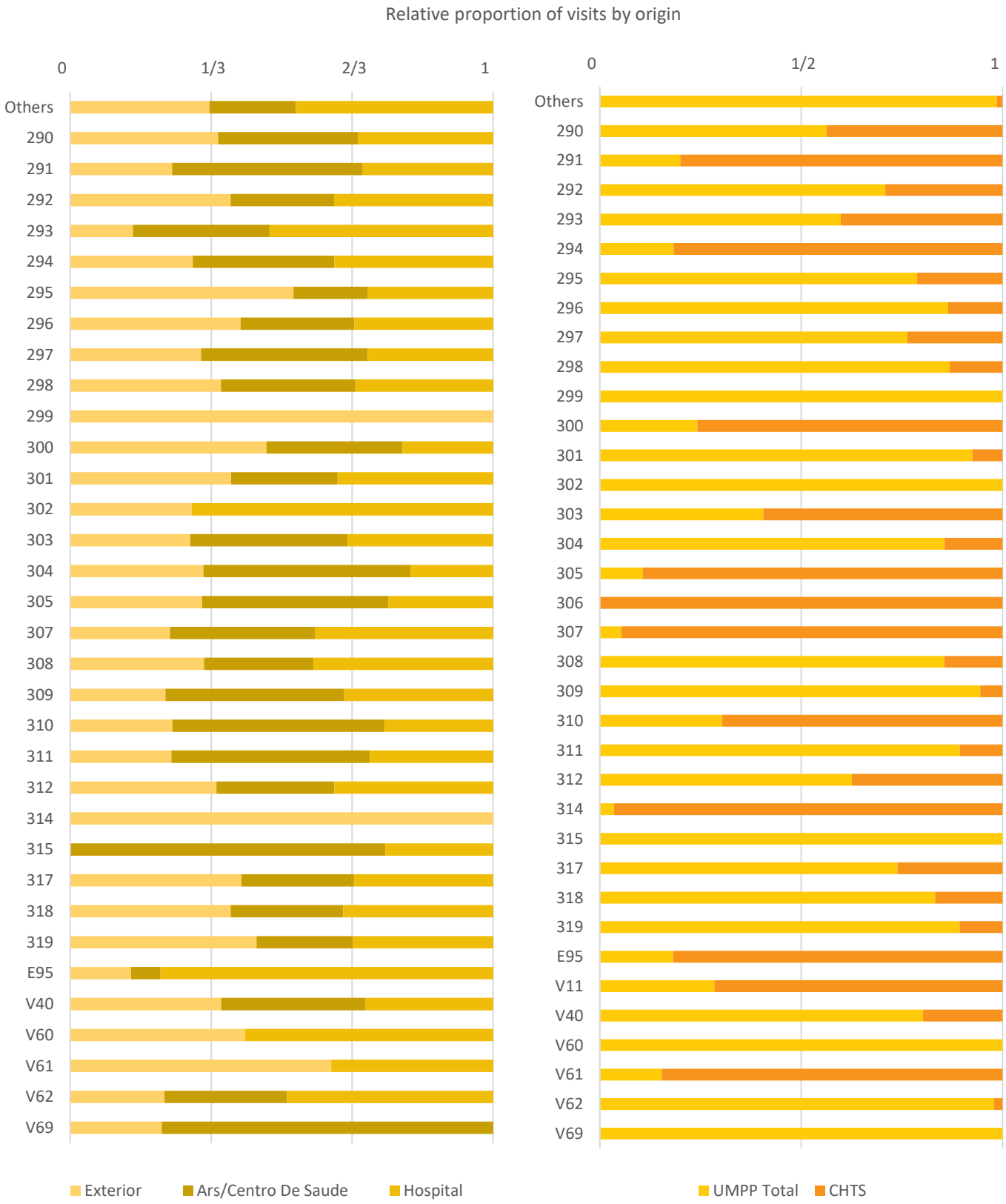
The differences in the distribution of diagnosis between EDs were found statistically significant ($p<0.001$), using a Chi-square test.

Graphic IV allows to compare proportion between group of origin for each diagnosis, adjusted for the total number of visits. For example, when adjusted by total number of visits of each group, it is more likely that a visit from an individual with Schizophrenia (ICD-9: 295) enters the ED from the exterior than from primary care. For *Neurotic disorders* (ICD-9: 300), it is, on the one hand, more likely that a visit of an individual enters the ED from the exterior, followed by primary care; on the other hand, it is very less likely that a visit from an individual with this diagnosis was transferred from a hospital institution. For *Alcohol dependence syndrome*, the proportion was similar between groups.

Except for *Alcoholic psychoses* (ICD-9: 291) and *Other organic psychotic conditions (chronic)* (ICD-9: 294), the ICD-9 group of Psychoses (290-299) is much more common in UMPP than in CHTS. The relative proportion of diagnoses in these two EDs is globally very heterogeneous.




**Graph X** - UMPP's and overall Emergency Departments' proportion of visits in 2015 and 2016 by ICD-9 discharge diagnosis. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.



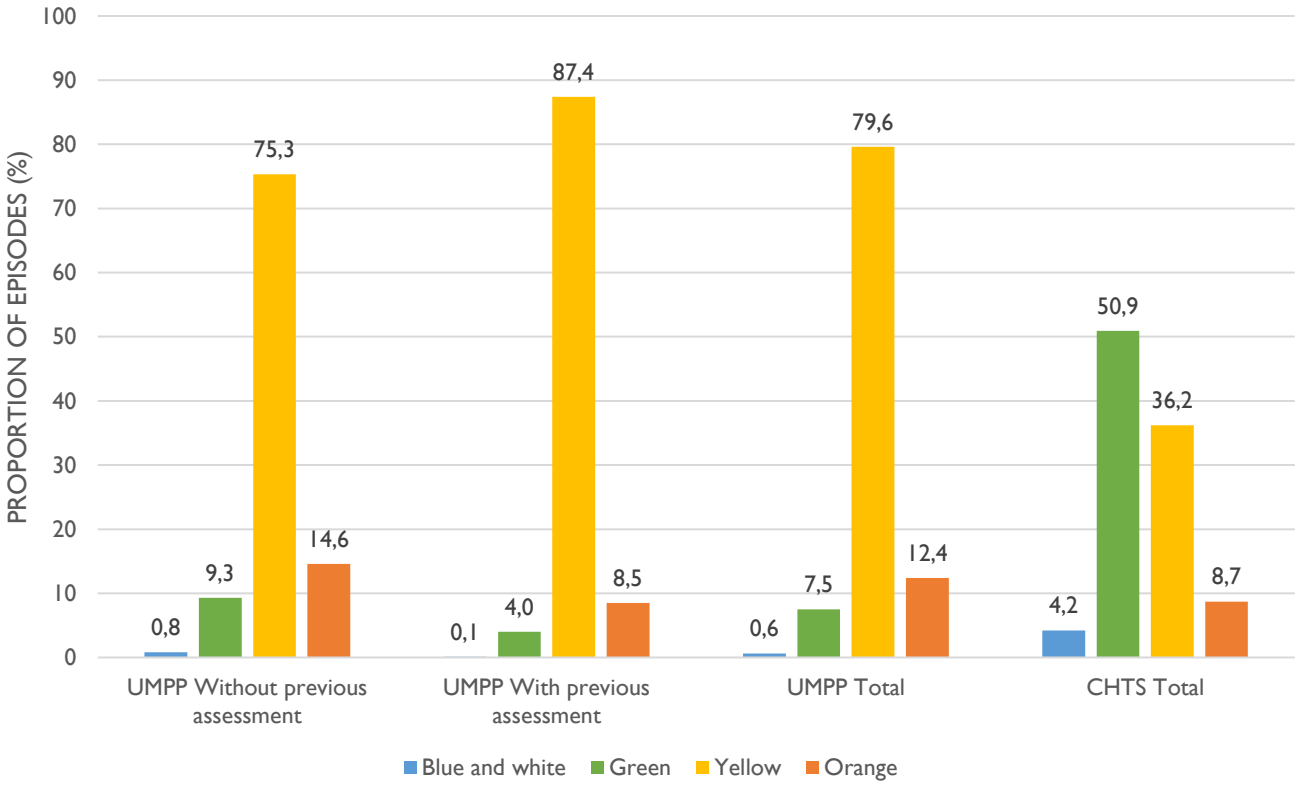

**Graph XI** – UMPP's and overall Emergency Departments' relative proportion of visits in 2015 and 2016 by CID-9 discharge diagnosis. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.

1.2

## DISTRIBUTION BY MTS BRACELET COLOUR

Table VIII summarizes the various outcomes studied in this work, by ED. UMPP is further categorized by status of previous assessment. Distribution by MTS bracelet color at admission is displayed in Graph XIII.

Bracelet's distribution is similar for both UMPP groups. *Yellow* was the most common (75.3% for the group without previous assessment and 87.4% for the group with previous assessment; 79.6% for total UMPP visits), followed by *orange* bracelet (14.6% for the group without previous assessment, 8.5% for the groups with previous assessment and 12.4% for UMPP total), then by *green* bracelet (9.3% for the group without previous assessment, 4.0% for the groups with previous assessment and 7.5% for UMPP total) and, at last, by *white and blue* bracelets, with residual frequencies (0.8% for the group without previous assessment, 0,1% for the groups with previous assessment and 4.2% for UMPP total.



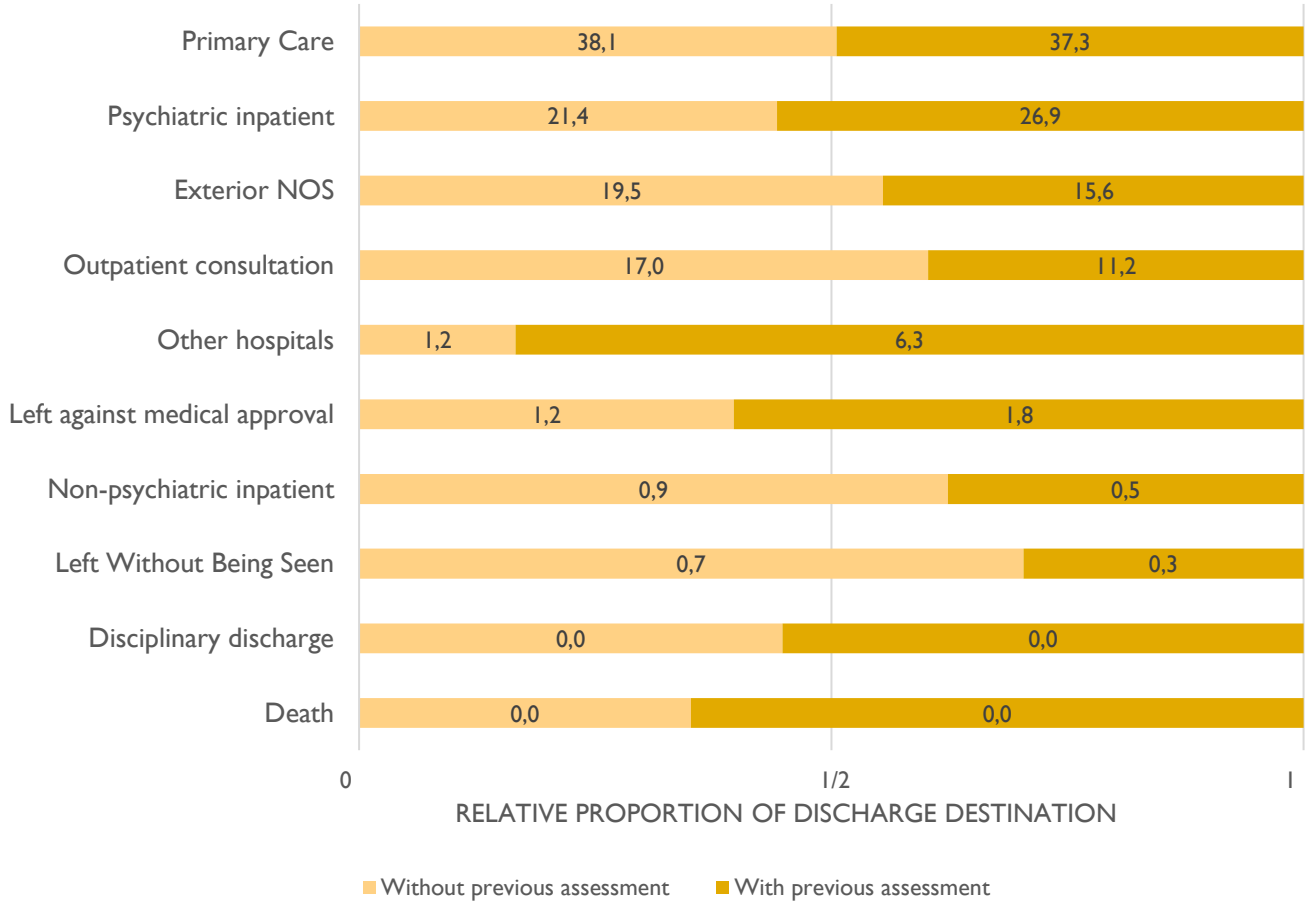

**Graph XII** - UMPP's and overall Emergency Department's proportion of visits in 2015 and 2016 by Manchester Triage System bracelet color at admission triage. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.

Differences between UMPP groups were found statistically significant ($p<0.001$), using a Chi-square test.

Bracelet's distribution also differs significantly between EDs ($p<0.001$, using a Chi-square test). At CHTS, the most common bracelet color was *green* (50.9%), followed by *yellow* bracelet (36.2%), then *orange* bracelet (8.7%) and, at last, *blue and white* bracelets (4.2%).

### DISTRIBUTION BY DISCHARGE DESTINATION

Graph XIII illustrates the relative distribution of discharge diagnosis by UMPP's groups and displays the values of each destination's proportion by groups.




**Graph XIII** – UMPP's relative proportion of visits in 2015 and 2016 by discharge destination. Labeled values refer to percentage of total in each group. UMPP: Urgência Metropolitana de Psiquiatria do Porto; NOS: Not otherwise specified.

Both groups' distribution follows similar patterns. *Primary care* was the most common destination at discharge (38.1% for the group without previous assessment and 37.3% for the group with previous assessment), followed by *psychiatric inpatient* (21.4% vs 26.9%), *exterior NOS* (19.5% vs 15.6%), *outpatient consultation* (17.0% vs 11.2%), *transference to other hospitals* (1.2% vs 6.3%), *left against medical advice* (1.2% vs 1.8%), *non-psychiatric inpatient* (0.9% vs 0.5%) and *LWBS* (0.7% vs 0.3%). *Disciplinary discharge* and *death* are residual discharge outcomes, both with values close to 0.0% in both groups.

This difference was found statistically significant ($p<0.001$), using Chi-square test.

Analyzing the relative proportion of discharge destination between both groups, we can observe that the biggest difference lies in *transference to other hospital*, with a much higher relative frequency in the group with previous assessment (6.3% vs 1.2%).

*Psychiatric inpatient* was relatively more frequent in the group with previous assessment (26.9% vs 21.4%) and this difference was also statistically significant ($p<0.001$), using a Chi-square test

*Left without being seen* was also relatively more frequent in the group without previous assessment (0.7% vs 0.3%, $p<0.001$), as well as *non-psychiatric inpatient* (0.9% vs 0.5%, $p=0.001$). *Left without medical approval* as more relatively more frequent in the group with previous assessment (1.8% vs 1.2%, $p<0.001$).

Grouping all the other possible discharge destinations than *psychiatric hospitalization*, *non-psychiatric hospitalization*, *LWBS* and *left against medical approval*, into a category generically called *exterior*, has a distribution also statistically significant between groups (75.8% for the group without previous assessment vs 70.4, $p=0.001$), as can be seen in Table VII.

Graph XIV displays the relative proportion of the main discharge destinations (for the purpose of this work) between UMPP and CHTS and the values of destination's frequency in each ED.

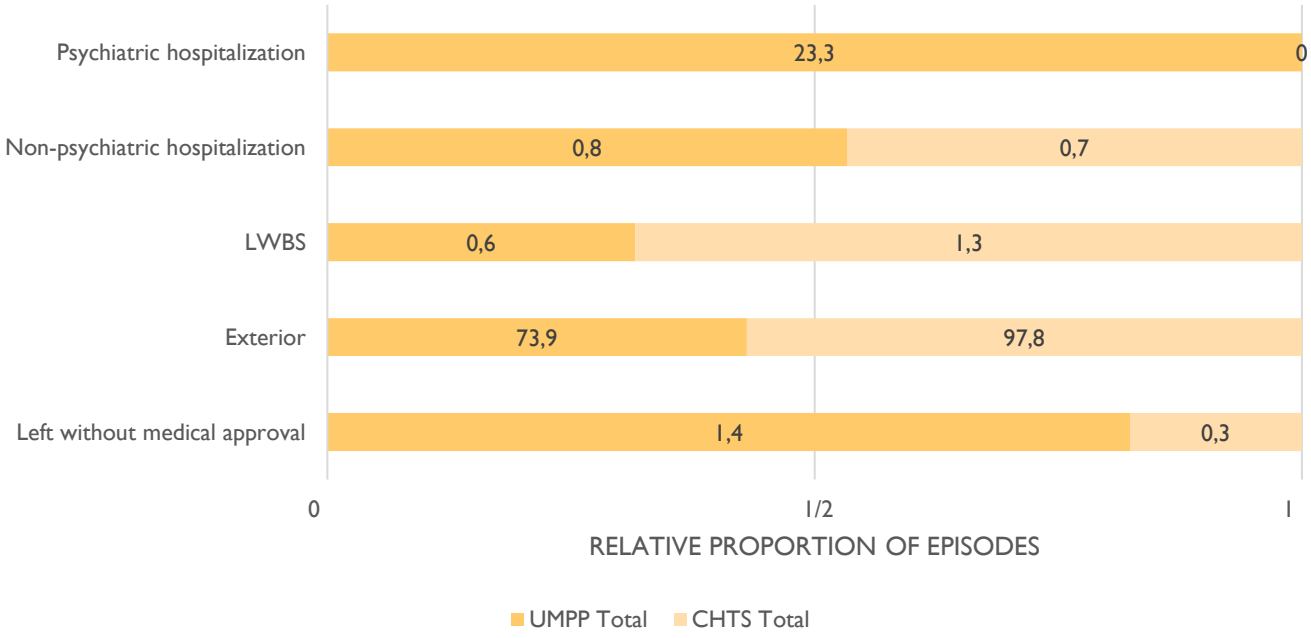
There were only psychiatric hospitalizations in UMPP (23.3% vs 0.0%, $p<0.001$).

Differences between ED were statistically significant ($p<0.001$) in *LWBS* (0.6% in UMPP vs 1.3% for CHTS), *left against medical approval* (1.4% in UMPP vs 0.3% for CHTS) and *exterior* (73.9% in UMPP vs 97.8% for CHTS).

| | | UMPP | | | | | | | CHTS | | UMPP vs CHTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Without previous assessment | | With previous assessment | | Total | | | Total | | |
| | | n | % | n | % | n | % | p | n | % | p |
| Discharge destination | **Psychiatric hospitalization** | 3813 | 21.4 | 2601 | 26.9 | 6414 | 23.3 | <0.001 | 0 | 0 | <0.001 |
| | **LWBS** | 127 | 0.7 | 29 | 0.3 | 156 | 0.6 | <0.001 | 144 | 1.3 | <0.001 |
| | **Against medical approval** | 215 | 1.2 | 177 | 1.8 | 392 | 1.4 | <0.001 | 29 | 0.3 | <0.001 |
| | **Non-psychiatric hospitalization** | 159 | 0.9 | 52 | 0.5 | 211 | 0.8 | 0.001 | 77 | 0.7 | 0.227 |
| | **Exterior** | 13543 | 75.8 | 6807 | 70.4 | 20350 | 73.9 | 0.001 | 10943 | 97.8 | <0.001 |
| MTS bracelet colour | **Blue and white** | 142 | 0.8 | 11 | 0.1 | 153 | 0.6 | | 465 | 4.2 | |
| | **Green** | 1660 | 9.3 | 387 | 4.0 | 2047 | 7.5 | | 5650 | 50.9 | |
| | **Yellow** | 13418 | 75.3 | 8446 | 87.4 | 21864 | 79.6 | | 4017 | 36.2 | |
| | **Orange** | 2592 | 14.6 | 817 | 8.5 | 3409 | 12.4 | <0.001 | 969 | 8.7 | <0.001 |
| **Frequent users (episodes by)** | | 1176 | 15.1 | 348 | 8.8 | 2124 | 13.5 | <0.001 | 460 | 4.1 | <0.001 |
| Readmissions | **24h** | 891 | 7.6 | 272 | 6.9 | 790 | 5.0 | 0.086 | 131 | 1.2 | <0.001 |
| | **48h** | 775 | 6.6 | 238 | 6.0 | 1014 | 6.5 | 0.119 | 216 | 1.9 | <0.001 |
| | **72h** | 608 | 5.2 | 181 | 4.6 | 1164 | 7.4 | 0.082 | 271 | 2.4 | <0.001 |
| | | n | mean (SD) | n | mean (SD) | n | mean (SD) | | n | mean (SD) | |
| Times | **Triage-observation** | 17791 | 38.7 (48.7) | 9656 | 34.0 (39.1) | 27456 | 37.0 (45.6) | <0.001 | 11143 | 60.3 (59.7) | <0.001 |
| | **Observation-discharge** | 17824 | 194.4 (200.4) | 9663 | 150.8 (157.5) | 27496 | 179.2 (187.7) | <0.001 | 11257 | 186.5 (226.6) | 0.033 |

**Table VII** - Summary of outcomes and indicators for each ED. UMPP categorized by status of previous assessment. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa; LWBS: Left without being seen; MTS: Manchester Triage System.

There was no significant difference (p=0.227) in *non-psychiatric hospitalization* (0.8% in UMPP vs 0.7% for CHTS).



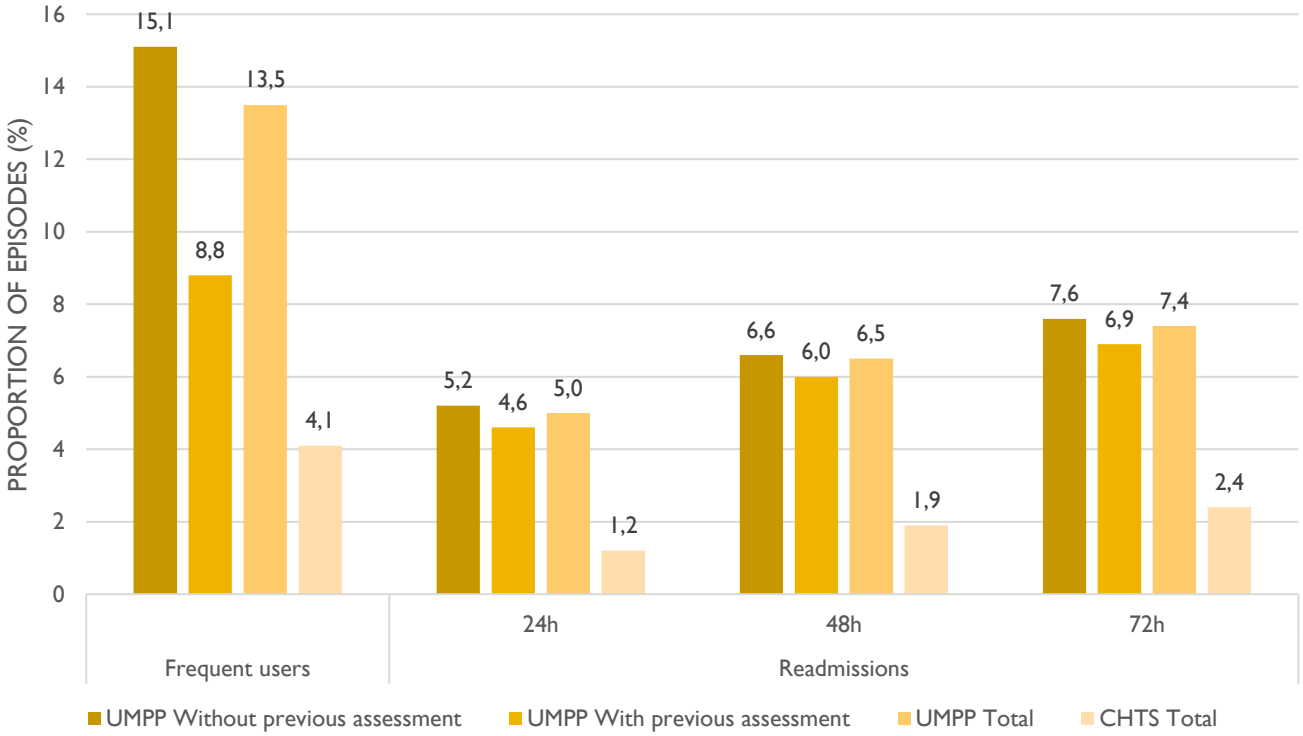

**Graph XIV** – Emergency departments' relative proportion of visits in 2015 and 2016 by discharge destination. Labeled values refer to percentage of total in each group. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa; LWBS: Left without being seen.

### FREQUENT USERS

Graphic XIV illustrates the proportion of episodes by frequent users and readmissions (at 24h, 48h and 72h) in each ED and in UMPP's categories.

There were a total 2124 episodes (13.5%) by high frequency users at UMPP, whereas at CHTS there were only 460 episodes (4.1%). Difference between these EDs was statistically significant, as calculated by a Chi-square test (p<0.001).

At UMPP, group with previous assessment had a total 348 visits (8.8%) by high frequency users, whereas the group without previous assessment had a statistically significant (p<0.001) higher proportion (1176 episodes, 15,1%).




**Graph XV** – UMPP's and overall Emergency Department's proportion of visits in 2015 and 2016 by frequent users and readmissions (at 24h, 48h and 72h). UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.

### READMISSIONS

There were no statistically significant differences between UMPP's groups in terms of readmissions, in all three periods (24, 48 and 72 hours). However, group without previous assessment presented higher frequencies in all 3 periods (at 24h, 5.2% vs 4.6%, p=0.086; at 48h, 6.6% vs 6.0%, p=0.119; at 72h, 7.6% vs 6.9%, p=0.082).

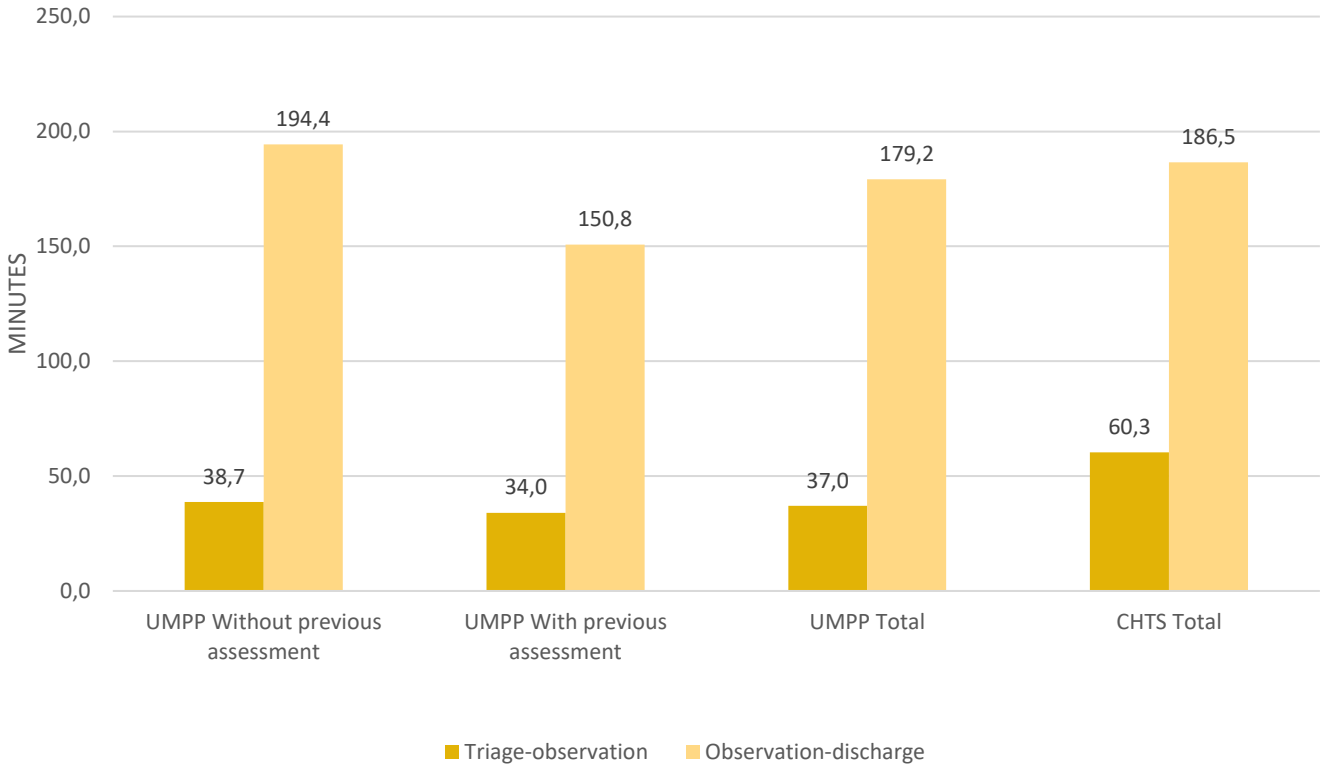
CHTS presented lower frequencies than UMPP in all three periods of readmission (p<0.001): at 24h, CHTS had 131 readmission episodes (1.2%), against 790 (5.0%) at UMPP; at 48h, CHTS had 216 readmission episodes (1.9%), against 1014 (6.5%) at UMPP; at 72h, CHTS had 271 readmission episodes (2.4%), against 1164 (7.4%) at UMPP.

TIMES

Graph XIII illustrates the mean times of *Triage-observation* and *Observation-discharge* of UMPP's groups and ED's totals.

*Triage-observation* time was smaller in all groups and EDs. Both times were higher in UMPP group of patients without previous assessment: *Triage-observation* had a mean time of 38.7 minutes (SD 48.7) in the group without previous assessment and 4.7 minutes less in the group with previous assessment (mean 34.0 and SD 39.1); *Observation-discharge* time was 43.6 minutes higher in the group without previous assessment (mean 194.4, SD 200.4 v mean 150.8, SD 157.5). These two differences were both statistically significant ($p<0.001$).

EDs presented diverse differences in each time. *Triage-observation* was 23.3 minutes higher in CHTS (mean 60.3, SD 59.7) in relation to UMPP (mean 37.0, SD 45.6) and this difference was statistically significant ($p<0.001$). *Observation-discharge* time was also significant between EDs ($p=0-033$), being 7.2 minutes higher in CHTS (mean 186.5, SD 226.6) than in UMPP (mean 179.15, SD 187.7).




**Graph XVI** – UMPP's and overall Emergency Department's proportion of visits in 2015 and 2016 by mean values of Triage-observation and Observation-discharge times. UMPP: Urgência Metropolitana de Psiquiatria do Porto; CHTS: Centro Hospitalar do Tâmega e Sousa.

# DISCUSSION

This work aims to compare two different models of emergency department on the management of psychiatric emergencies: a specialized psychiatric unit within a third-line major emergency department, and a general medical area within the emergency department of a second-line hospital. Furtherly, we intended also to analyze potential differences according to patient's origin, within the specialized psychiatric ED.

To explore such a complex unit as an emergency department can surely prove to present high complexity, since there are so many and so intricate variables to be counted in. It might feel that the work always turns to become somehow incomplete.

Urgência Metropolitana de Psiquiatria do Porto and Centro Hospitalar do Tâmega e Sousa are very distinct units, whether in terms of volume of admissions, availability of medical staff (specialized and not specialized), availability of auxiliary methods of diagnosis, access to multidisciplinary evaluation and management of discharge options.

For these differences, and the distinct positions in the hierarchy of hospital referral network, these two EDs work complementary. When a specialized psychiatric evaluation is needed, patient is transferred from CHTS to UMPP. However, this situation represents only a small proportion of episodes. In 2015 and 2016, of a total 11257 visits in CHTS, only 1628 (14.5%) were transferred to UMPP. This means that about 85.5% of mental health crisis were managed in CHTS, by physicians not specialized in mental health. Similar episodes, being admitted initially at UMPP were always managed by a psychiatrist or a psychiatry trainee. This situation might represent a barrier to an ideal equity of access to health care.

We found significant differences in all sociodemographic variables tested, whether within UMPP or between EDs. Despite being significant (probably because of the very large sample), sex and age distribution seems to be very similar in all groups, which may confirm an expected similarity between populations that are geographically close and demographically identical.

Sex has different associations with ED access across several studies. Some studies did not found differences in sex (Arfken et al., 2004), others found higher proportion of males (Saarento et al., 1998), and others of females (Lindamer et al., 2012). Higher

frequency of women in this work probably reflects the epidemiology of the most represented disorders (mainly neurotic) in the EDs.

Social variables present heterogeneous results. Within UMPP's groups, the group of patients arriving from the exterior naturally decreases its frequency as far as they are from the hospital. This is probably a consequence of the open-door model: the easier the access, the higher the demand. On their turn, patients transferred form health institutions do not present this tendency, in fact, 10-29km was the most frequent distance for primary care transfer and 30-50km the most frequent for hospital transfer. The difference between this two groups is probably due to the concept of proximity care in which primary care is funded upon, as well as the fact that UMPP is an end-point structure in the referral network, receiving patients from hospitals in a wide area of the North of Portugal that, for a principle of geographic distribution, are more separated from each other.

CHTS has two hospital structures that serve a population in a geographic area of with less than 60km of major axis distance. It also acts like a proximity structure, which explains why about 99% of the episodes are from patients that live in less than 30km to one of the CHTS EDs.

The status of co-payment differs drastically between CHTS and UMPP, once CHTS has about 2.5 times more episodes from exempted patients. Since the majority of these exemptions are due to financial issues, this difference is explained by the differences in the socioeconomic status of the two populations. The region of Vale do Sousa, compared to Porto and the neighbor counties, has a population with lower academic differentiation, culturally less evolved and with lesser financial resources, which puts a large part of the population above the threshold for having access to exemption of co-payments.

There is a significant difference of about 22 visits per day between UMPP and CHTS, which was expected, since UMPP serves, as tertiary unit, a population of about 3,000,000 individuals, whereas CHTS is the reference hospital for about 550,000 individuals.

Seasonality is a well-established phenomenon found in many psychiatric disorders (Fossey & Shapiro, 1992). This factor, as well as annual variations in the resident

population of the studied regions due to vacations and emigration may explain variations in access to ED during the year. Although statistically significant for an $\alpha$ of 0,05, differences in annual distribution by UMPP's categories do not seem very extreme, and may reflect mainly availability of resources in the structures that refer to UMPP. For example, while in August, exterior admissions achieve a peak, primary care admissions have a relevant breakdown; in the one hand, with emigrants return, point population increases, increasing exterior admissions; in the other hand, primary care physicians are in vacation, reducing transfers to UMPP.

Differences in annual distribution also showed statistically significant, even though a graphical analysis shows the distributions follow similar paths. This is probably due to the large sample studied.

There are no solid known variations for psychiatric crisis occurrence in different days of the week. Our data shows, for UMPP, lower frequency of admissions during weekend, which might reflect, in the one hand, a lower exposition to situational stress (mainly at work), and in the other hand, patients' lower disposition to resort to health care facilities during work-free days. Following this hypothesis, it is expected that in the first day after weekend there would be an increase in access, which in fact happens in UMPP.

While there are only very small differences between exterior access and hospital transfer, during weekend, access from primary care drops significantly, which is comprehensible since there are only very few primary care units that work during weekend, as opposed to hospital units.

Differences between EDs showed also statistically significant. Contrary to weekend pattern at UMPP, at CHTS, Sunday is the weekday with more visits. We can speculate that, in this population, there is an opposite effect to the one hypothesized for UMPP: since in CHTS population work status is more unstable, these patients might prefer to recur to the ED in days when they won't have to miss work.

Differences in UMPP's groups on distribution by hour of the day, statistically significant, reflect both population routines and healthcare institutions' activity. There is a sustained drop in visits in all groups from about 20:00h, until they reach residual values during dawn, with a major increase since 8:00h, the common start of the workday.

Primary care, again, presents higher variance in distribution, because its units mainly work during day-hours. Hospital admissions are not subject to these constraints, resulting in the lower variance. Two peaks are achieved at 9:00-11:00 and 14:00-16:00, for primary care and exterior, with a breakdown within, probably for lunch-time. Hospital institutions usually do not follow such defined schedules, and so the peaks are not so pronounced.

Hour distribution in each ED seem very similar, although the difference between them was statistically significant, again, probably a result of the large sample used. Variance was higher in UMPP, because of the more heterogeneous origin of admission.

Manchester Triage System is the triage method used widely in psychiatric emergency departments in Portugal and also in many other countries (Schellein, Ludwig-Pistor, & Bremerich, 2009). It follows fixed algorithms, accessed by a triage nurse that allocates patient's principal presenting complaints to one of 52 flowchart diagrams, furtherly associating possible discriminators that determine priority and orientation to a specific ED department (Christ, Grossmann, Winter, Bingisser, & Platz, 2010). Although it was designed to achieve objectivity, it is always subject to operator's variability.

In all UMPP's groups, *Mental disorder* was by far the most frequent MTS flowchart, followed by *Strange behavior*. *Overdose and poisoning* and *self-injury* present much lower proportions. Apart from the epidemiology of psychiatric disorders, this might reflect also the orientation these patients get in the ED. These clinical presentations must be initially assessed by an emergency physician (Internal Medicine, General Practice or Surgery). After organic stabilization, patient can be transferred to the psychiatric ED if the physician finds appropriate.

Although differences between UMPP's groups were found statistically significant, a graphical analysis shows that the greatest difference is present in *Overdose and poisoning*, where primary care admissions are only residual, which is comprehensible, since a patient with this condition does not usually recur to primary care institutions, but to EDs (that may finally transfer to UMPP).

The group of flowcharts *Others*, comprising all the other flowcharts than the directly related to mental health, was much more frequent in admissions from the exterior. Since these patients were not previously assessed, they can focus on symptoms

that initially may be related to other domains and be directed to other areas in the ED. After the first assessment, finding psychiatric symptoms, the physician might transfer the patient to psychiatric ED.

Distribution between EDs follows very different patterns, the difference being statistically significant. At CHTS, the clear majority of patients has a flowchart at admission not related to mental health, which means that they got a psychiatric diagnosis at discharge. This big difference can be explained partly by different operators executing the triage process, higher proportion of patients admitted from the exterior at CHTS, patient's characteristics and as a result of the operationalization of the inclusion criteria used to define psychiatric emergency in CHTS (different than UMPP's). Also, the fact that there is no psychiatric ED in this emergency department, might induce the triage nurse to disregard for the mental health related flowcharts.

The same hypothesis may explain differences between EDs in terms of MTS discriminator, where the category *Others* is even more frequent at CHTS.

Origin groups at UMPP also showed significant differences in MTS Discriminator. *Significant psychiatric history* is the most frequent discriminator in all groups, with similar frequencies. Group *Others* also appears with more frequency in episodes from the exterior, probably for the same reasons stated before for MTS flowchart, but here more frequently than before. Risk of self-injury is the second most frequent discriminator in episodes from hospital transference, representing patients that are previously accessed for attempted or self-injury thoughts and transferred for UMPP for psychiatric assessment; the same happens, less frequently, in primary care. *Risk of aggression* doesn't seem to vary substantially between groups. *Disruptive behavior* is less frequent in episodes arriving from the exterior, representing probably individuals only from CHSJ area of referral or neighbor counties, since these patients usually require rapid contention. *Deep anguish* is more frequent in primary care and exterior, probably reflecting less exuberant episodes that do not require immediate contention.

*Neurotic states* were the most common diagnosis in both EDs, but its frequency was more than 3 times higher at CHTS. More specifically, *Anxiety states* represented more than 85% of these episodes. Although a mental health crisis, an Anxiety state usually does not represent a psychiatric emergency needing assessment by psychiatrist in an acute phase. Stabilization of the acute crisis can be achieved by any general physician

in a primary care setting or even in ED. This justifies why its frequency was lower in individuals arriving at UMPP from primary care and hospital transfer than in those from the exterior.

*Others* was the most common diagnosis in episodes transferred from hospital and the third most frequent in all UMPP (14.1%). Less than half of its specific sub-diagnosis at UMPP were Poisoning by other and unspecified drugs and medicinal substances and Insomnia, the first being related to psychiatry usually as a means of self-injury, a clinical situation usually requiring psychiatric assessment. The other half was probably 'false' psychiatric emergencies, this is, episodes referred to psychiatric ED that were not real psychiatric emergencies.

The difference from CHTS in the frequency of the group *Others*, with only a residual value, is a consequence of the inclusion criteria operationalization used to define psychiatric emergency at CHTS.

*Depressive disorders* was the most frequent diagnosis for primary care admissions, which might mean that depressed patients primarily resort to primary care for this condition, being transferred finally to psychiatric emergency, usually by risk of self-injury, which was the second most frequent MTS flowchart in admissions from primary care.

Psychoses, a paradigmatic group of psychiatric disorders, only account for a minority of episodes. This might reflect, in the one hand, the higher prevalence in the population of Mood disorders, Anxiety disorders and Adjustment reactions, against Psychotic disorders; in the other hand, it might reflect as well, a lower predisposition to resort to medical by psychotic patients, who usually lack insight for their condition.

After *Neurotic disorders*, the most frequent diagnosis at CHTS were substance use-related disorders (alcohol and other drugs), with much higher frequencies than UMPP. This is very likely to be a consequence of the epidemiology of these disorders in this population.

Globally, differences in diagnosis between EDs might reflect differences in population's epidemiology, differences in medical staff ability to define a psychiatric diagnosis (although never very accurate in a ED setting, attribution of a psychiatric diagnosis should be more accurate in the psychiatric ED) and differences in the model of the ED (the psychiatric having more variability of diagnosis).

Manchester Triage System's validity in psychiatric emergencies has long been disputed. However, as in other medical areas, its color scale should represent gravity of an episode (Azeredo, Guedes, Rebelo de Almeida, Chianca, & Martins, 2015).

MTS bracelet distribution by status of previous assessment at UMPP, significantly different, reveals lower frequency of less severe categories (*blue and white* and *green*) in the group with previous assessment. This was expected, since situations without gravity are not supposed to be transferred to an emergency department, especially after an assessment was made by a medical doctor.

*Orange* bracelets, the highest gravity group evaluated (red bracelets were excluded since, by definition, represent medical emergencies), have higher frequencies in the group without previous assessment. These clinical situations require rapid response; in psychiatry emergencies, usually represent agitation states, needing fast stabilization. Patients arriving after previous assessment are usually already stabilized in terms of agitation or imminent risk of self-harm or aggression, so they fit no more in an orange bracelet.

Bracelet's distribution in CHTS is very different from UMPP. Lower severity categories (*blue and white* and *green*) have much higher frequencies. *Green* was the most frequent bracelet (whereas in UMPP it was *yellow*). *Yellow* and *orange* bracelets had lower frequencies than at UMPP.

These differences, statistically significant, might represent a globally lower severity of episodes at CHTS. As a specialized psychiatric ED, UMPP receives transferred patients in need of urgent psychiatric care, and these patients, by definition, should get higher severity bracelets; CHTS receives mainly patients from the exterior. Once again, differences between EDs may also be affected by different triage nurse operators.

All UMPP's discharge destinations (categorized in five groups) by status of previous assessment had statistically significant differences.

Psychiatric hospitalization was 26% higher in the group with previous assessment, probably reflecting the hypothesis that transferred patients present more severe situations. Some of them are only transferred to UMPP to proceed to hospitalization. In the referral regions of the hospitals included in the UMPP, psychiatric hospitalizations

are, in their majority, proceeded via UMPP, since there are only few exceptions to proceed to inpatient directly in the inpatient facilities.

Hospitalization in CHTS psychiatric inpatient unit is, besides few exceptions, only made via UMPP. This explains why there are no discharges to psychiatric hospitalization in CHTS ED: these patients must get to UMPP to proceed to it.

Non-psychiatric hospitalization was an uncommon outcome (which is expectable, since we analyzed psychiatric events). It was almost twice more frequent in the group without previous assessment. This probably reflects again cases of 'false' psychiatric emergencies, which are more prone to happen when there is no previous medical assessment before referring to ED. There were no differences in this outcome between EDs.

Discharges against medical approval were more common in the group with previous medical assessment. This situation usually happens when a patient refuses hospitalization and does not have criteria for a compulsive hospitalization. Thus, it is comprehensible that this outcome is also more frequent within the group with more hospitalizations.

The same principle applies to the differences in this outcome between EDs, where UMPP has a higher frequency than CHTS. At CHTS, discharges against medical approval usually occur when a patient refuses transferal (mainly to UMPP) and cannot be compulsively transferred.

Being left without being seen is also a rare outcome in both EDs. At UMPP, it is more frequent in the group without previous assessment. It is unlikely that an individual already assessed by a doctor and transferred to another health institution, knowing he really needs further medical evaluation, opts to abandon the ED without being seen. It may also a consequence of the higher waiting times (Triage-observation) in the group without previous assessment.

Episodes from patients left without being seen are also more frequent at CHTS than UMPP, probably for the same reasons stated above: at CHTS, more than 94% of patients arrive from exterior. Waiting time for observation is even longer for CHTS.

Discharges to *Exterior* (as a group including all other discharge options), are also more frequent in episodes without previous assessment, probably as a consequence of

higher rates of psychiatric inpatient (the second most common discharge outcome at UMPP, after discharge do primary care, which doesn't have an important difference between groups) in the other group.

A remark must be made about discharge with transference to other hospital, a much more frequent outcome in UMPP's group of episodes with previous assessment. It probably represents patients transferred for psychiatric evaluation at UMPP that do not meet criteria to psychiatric hospitalization and need to return to the origin hospital to complete a possible organic assessment or to guarantee patient's transportation.

All differences in times analyzed for UMPP's groups or for ED were found statistically significant.

*Triage-observation* time had a mean 4.7 minutes higher in the group without previous assessment, which is probably a consequence of the time doctors take to prepare patient's assessment: in the case of transferred patients, they usually bring a summary of the episode, making the fundamental information more easily accessible.

The same principle might justify the mean difference of 43.6 minutes in *Observation-discharge* time, lower in the group with previous assessment. In addition to the already available medical information summarizing the previous assessment, many patients transferred from hospital institution have already been submitted to auxiliary diagnostic tests, that do not need to be processed again at UMPP.

*Triage-observation* time has a mean 23.3 minutes higher at CHTS than UMPP. This might reflect higher frequency of MTS bracelets with less gravity and eventually differences in medical staff (possibly not matching adequately ED's volume of admissions).

*Observation-discharge* time had a mean 7.3 minutes higher in CHTS than UMPP. Although statistically significant ($p=0.033$), this difference is not very expressive, and might also traduce differences in ED's logistics.

High frequency users and readmission results must be evaluated with caution. In the absence SNS user number at UMPP to calculate these variables, we used Patient's File number. Unfortunately, only 42.9% of the total episodes didn't have data on this number. At CHTS, we had data on SNS user number for all patients, and to be as

accurate possible in this ED, it was the linking variable used to calculate the same variables.

Given the large number of episodes at UMPP, loss of statistical power wouldn't be the main problem, but the possibility to introduce selection bias, which may have overestimated the true difference between EDs.

We do not know the criteria to have been attributed a Patient's File number at CHSJ, but even if all the patients without this number do not represent a high frequency user or a readmission, UMPP would always have higher proportion of episodes in each of these indicators, since the differences to CHTS are more than three times higher in all of them: 3.3 times more episodes by high frequency users, 4.1 times more readmissions at 24h, 3.4 more readmissions at 48h and 3.1 times more readmissions at 72h.

This problem should not have been extended to the differences between groups at UMPP, since we used Patient's File number for both. Group without previous assessment had 1,7 times higher proportion of visits of high frequency users; this difference was statistically significant.

There were no statistically significant differences between UMPP's groups in readmissions, even though the group without previous assessment had higher proportion in all times of readmission.

There are many factors influencing access and outcomes to the ED. Many of them could not be included in this work, either because data on them was not available and because it would provide too much information to be assimilated in one academic work.

Our results point to relevant differences in psychiatric emergencies between psychiatric ED and a general ED without psychiatric specialization. Although many of them might be a reflex of differences in the populations studied or the ED's characteristics, some indicators point to higher misuse of the ED, such as higher proportion of high frequency users and readmissions, as well as higher frequency of possible 'non-psychiatric' episodes. Other indicators point to higher usage of the non-psychiatric ED by episodes with less severe gravity.

Relevant differences have also been found between groups with different status of previous assessment. Globally, episodes from patients with previous assessment seem

more severe, more accurately 'psychiatric', less prone to high frequency users and are dealt more quickly.

These results can contribute to better understand the functioning of the units studied, the differences between them and, possibly, to shed some light on future strategies to achieve better performance at EDs, reduce misusage and pursuit higher equity.

British National Institute for Health and Care Excellence guidelines for adult mental health state the assessment and referral procedures for urgent and crisis mental health should include alternatives to emergency department, such as 24-hour helplines, crisis resolution and home treatment teams, and the ability to self-refer (London Strategic Clinical Networks, 2014).

Some of the mentioned structures already exist in the North of Portugal: SNS 24® telephone helpline and crisis outpatient consultation but, at our knowledge, there are no relevant studies evaluating their efficacy and efficiency.

Misuse of the psychiatric EDs has already been overviewed in this work. Consistent explanations for this phenomenon in UMPP have already been proposed by Alves (2013), who found that barriers in the access to mental health care in the established network (primary care, outpatient consultation, community psychiatric services, social support, etc.) led to a bypass in this system, and patients looked for support in the ED, as a structure with easier access.

There are many relevant works approaching Health Systems' accessibility and usage. Godlberg & Huxley (1980) developed a model to characterize mental health patient's pathway through health care facilities, identifying its obstacles.

Further research should be performed to evaluate efficacy and efficiency of alternative or complementary models of psychiatric ED, as access only by previous assessment, or nurse triage, a method with consistent results in some countries (Sinclair et al., 2006; Wand, 2004; Wand et al., 2011).

This work faces some relevant limitations, the greatest being the different inclusion criteria operationalization assumed for each ED. Since the definition of psychiatric emergency was different for each ED, there could have been selection bias

influencing result's validity. The same problem poses, as already mentioned, for the calculation of high frequency users and readmission.

Analyzing two different hospital structures (secondary vs tertiary, local vs metropolitan) in terms of referral population, human and non-human resources, logistics, may affect comparability of the pursued outcomes.

Also, the quality of the data analyzed cannot always be guaranteed. Most variables are informatically introduced by doctors in the ED software, while managing patients. In an environment with such high levels of stress, as an ED, this information may not be the most accurate. As discussed before, discharge diagnoses are an example.

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